DIA RUBBER WORLD

AUGUST, 1943

Newsletter No. 8
AUGUST, 1943

Published by Rubber Chemicals Division of DU PONT

SRA NO. 1

A General Purpose Accelerator for GR-S

A general purpose accelerator may be defined as one which produces safe processing stocks having a suitable rate of cure and resulting in vulcanizates having the desired properties for any type of product. Such an accelerator has never been developed. However, SRA No. 1 fulfills the following requirements of a general purpose accelerator for GR-S:—

1. Safe processing
2. Fast curing
3. Economical
4. Easy to use—is self activated, requires no secondary accelerator
5. Produces vulcanizates having excellent physical properties and resistance to aging.

The physical properties of SRA No. 1 are listed below:—

Chemical Composition	—A physical mixture of MBT and DPG
Appearance	—A light cream colored powder
Specific Gravity	—1.28
Melting Point	—166°C. (approximate)
Storage Stability	—Good
Health Hazards	—None when used in GR-S in the amounts recommended.
Activation	—No secondary accelerator required
Zinc Oxide	—Use of 3 to 5 parts recommended
Stearic Acid	—Use of 1 to 2 parts recommended
Amount to Use	—One part of SRA No. 1 with 2.5 to 3 parts of sulfur, or 1.3 part SRA No. 1 with 2 parts of sulfur.
Curing Range	—250°F. and above. Normal cures in 30 minutes at 287°F.

SRA NO. 1 is a good general purpose accelerator for GR-S and will undoubtedly be found to have special characteristics to meet the requirements of certain specialized applications. It is expected that other accelerators and accelerator combinations such as Thionex, 2-MT-Accelerator 808, and activated MBT and MBTS, will continue to find favor for certain uses. But the properties imparted by SRA No. 1 demand its investigation wherever the combination of economy and quality is of interest. An example of the properties imparted by SRA No. 1 is shown in the accompanying table.

TEST COMPOUND	
GR-S	100.0
Channel Carbon Black	50.0
Zinc Oxide	5.0
Sulfur	2.0
Stearic Acid	1.0
SRA No. 1	1.3
PHYSICAL TEST DATA	
Optimum Cure at 274 F — Minutes —	60
Stress at 300% Elongation — psi —	1750
Tensile Strength at Break — psi —	3450
Elongation at Break — % —	465
Hardness — Durometer, Shore A	63
Tear Strength—lbs. per inch at 30°C.	235
at 70°C.	255
Heat Build-Up—Goodrich Flexometer—1/6-inch Stroke — 20 Minutes — °C.	52

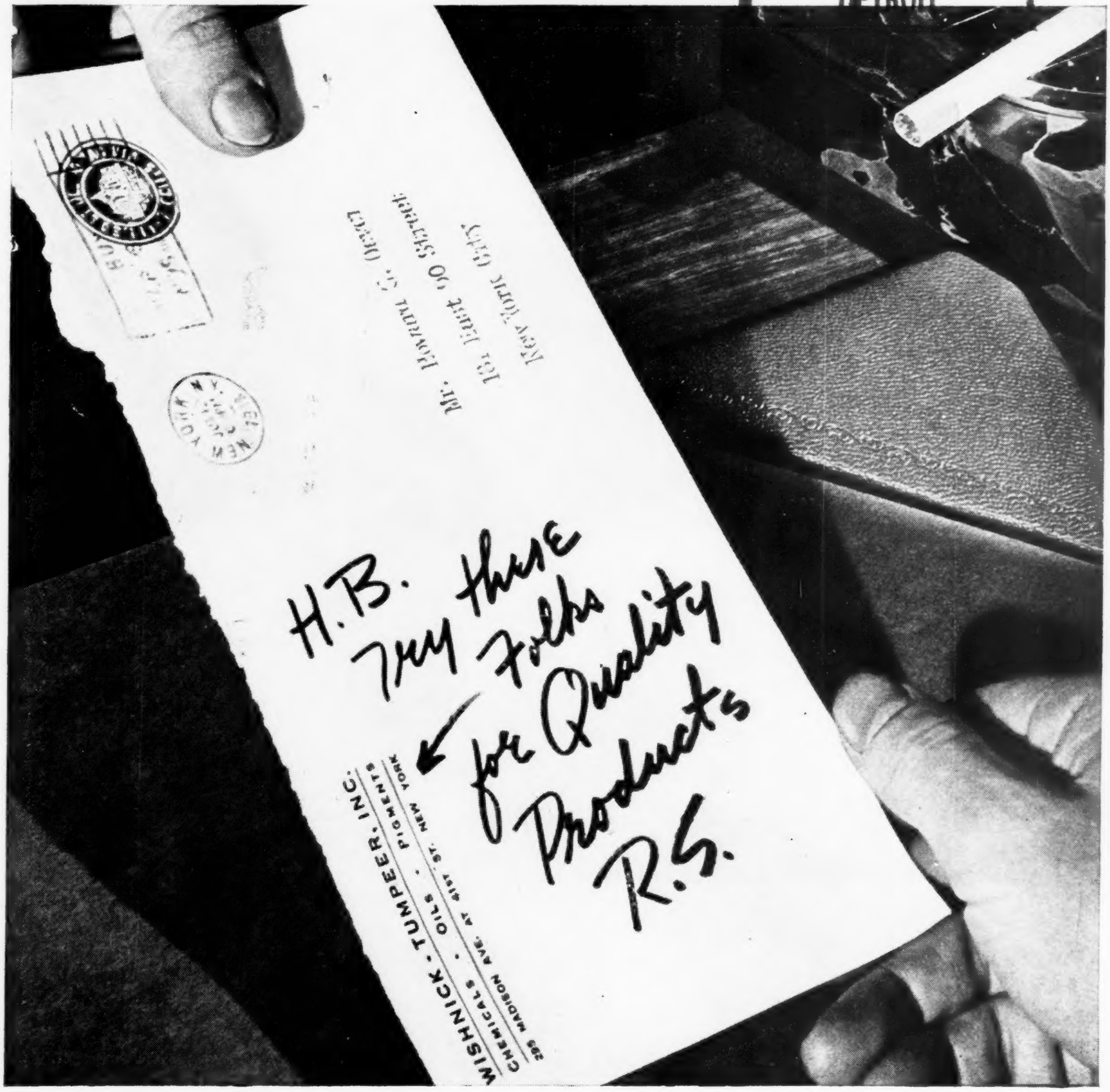
SRA No. 1 is that particular mixture of MBT and DPG which has been found to be exceptionally effective and economical. It is blended to provide an easy method of handling, and you will want to try it in both the laboratory and the factory.

DU PONT

RUBBER CHEMICALS DIVISION

BETTER THINGS FOR BETTER LIVING . . . Through Chemistry

INDIA RUBBER WORLD, August, 1943, Vol. 108, No. 5. Published monthly by BILL BROTHERS PUBLISHING CORP., Printing Office, Philadelphia, Pa. Editorial and advertising offices, 386 Fourth Avenue, New York 16, N. Y., U. S. A. Entered as second-class matter October 5, 1889, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription, United States and Mexico, $3.00 per year; all other countries, $4.00; single copies, 35 cents.



GIVE WITCO CARBON BLACK NO. 12 A TRIAL

Witco Carbon Black No. 12 is an excellent near substitute for furnace type black and is recommended for use in the production of heavy duty tires made with natural, synthetic or reclaim rubber. It is an easy processing black that gives a highly satisfactory combination of low heat generating properties in the tire and good wear resistance in the tread. Witco Black No. 12 is proving to be effective in Buna S formulations. Your request for samples and further information will be given our prompt attention.

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New York 17, 295 Madison Ave. • Boston, 141 Milk St. • Chicago 11, Tribune Tower • Cleveland 14, 616 St. Clair Avenue, N. E. • Witco Affiliates: The Pioneer Asphalt Company • Panhandle Carbon Company

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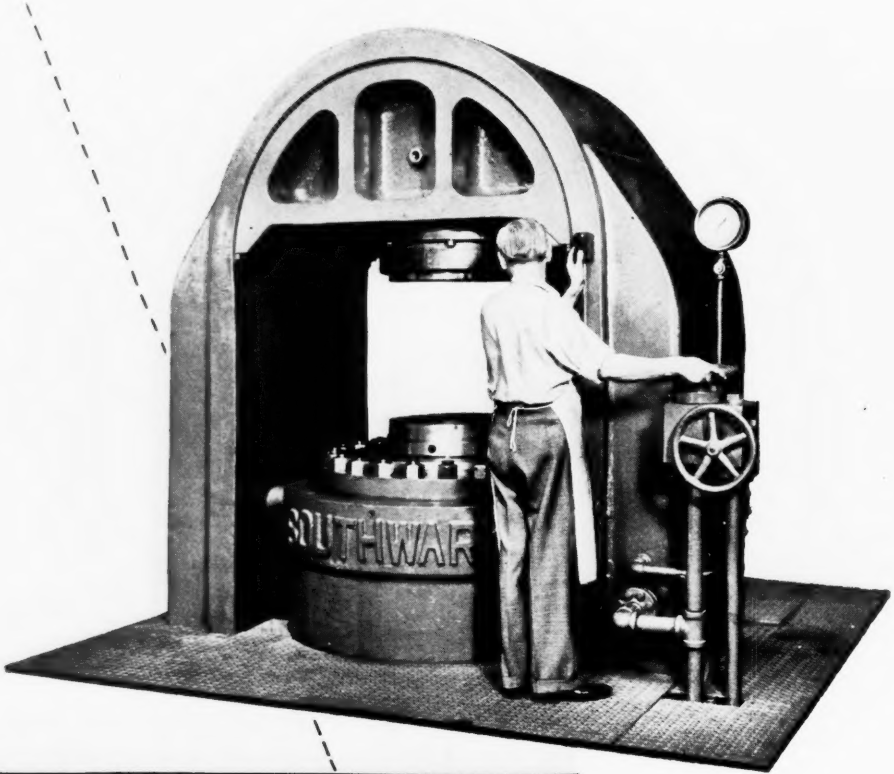


FOR DIE-HOBBING

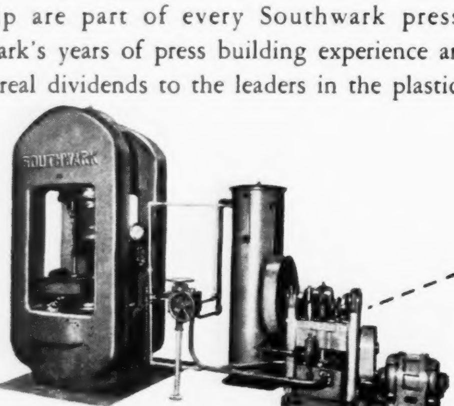
Southwark Hydraulic Presses

Close control, smoothness in power application and rugged dependability are built-in features of Southwark hydraulic presses. These qualities are indispensable for accurate die-hobbing.

Sound design, good materials and honest workmanship are part of every Southwark press. Southwark's years of press building experience are paying real dividends to the leaders in the plastics industry now that uninterrupted production is all-important.

When you're planning new plant equipment for the competition of tomorrow it will pay you to specify Southwark.

Baldwin Southwark Division, The Baldwin Locomotive Works, Philadelphia; Pacific Coast Representative, The Pelton Water Wheel Co., San Francisco.



BLW THE BALDWIN GROUP

BALDWIN SOUTHWARK

Division THE BALDWIN LOCOMOTIVE WORKS, *Philadelphia, Pa.*

CLOSE HARMONY

PELLETEX and BUNA S

In the compounding of synthetic rubber under the forced draft of war necessity, the superior advantages of PELLETEX and GASTEX, pioneers and leaders among semi-reinforcing carbon black pigments, have been quickly recognized. Without the introduction of a semi-reinforcing black, loaves of baled rubber as pictured here, would be less useful in many applications.

The easy processing and superior aging properties of PELLETEX, its low heat build up, resistance to oxidation, and low permanent set make it the choice of leading technicians, while its ability to endure heavy loadings without undue stiffness is of great importance at this time.

Finally, the well-known properties of PELLETEX compounds in withstanding severe service conditions particularly when oils, acids, and solvents are encountered, further accent its popularity.

Now on 100% Government allocation, PELLETEX thus merits your consideration for post-war developments.

HERRON BROS. & MEYER

OHIO BLDG., AKRON, OHIO.

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It is not by chance that TITANOX is the dominating name among opaque white pigments employed in the Rubber Industry. By making TITANOX pigments the finest white pigments that science and skill can create, their producers have made sure of their leadership.
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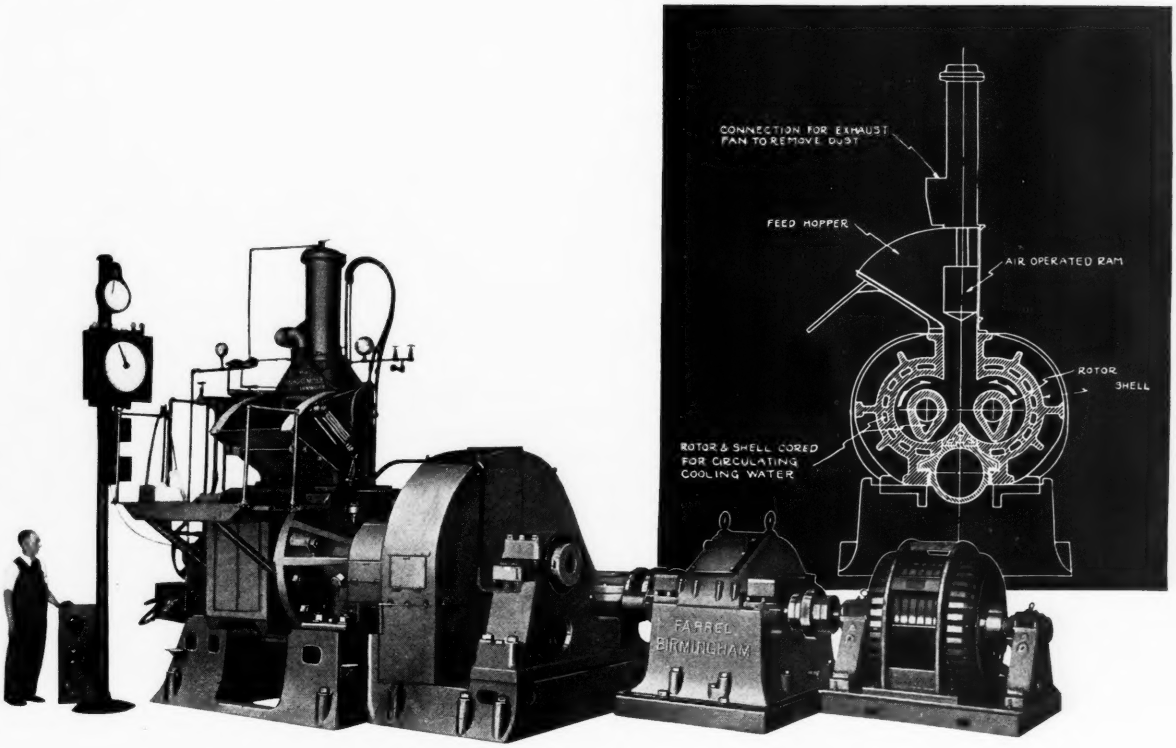

For better MIXING of New Materials there is still the BANBURY MIXER

THE Banbury Mixer was originally designed to produce rubber and plastic stocks of higher quality and uniformity and at a lower cost of production than had been possible by other methods. The advantages of the Banbury design and the exceptional performance of the machine led to its universal acceptance as the most efficient and economical method of mixing.

Modified to meet new needs and adapted to new techniques in processing new materials, the Banbury is also the best machine for handling GR-S, GR-P, GR-N, GR-I, and Buna N synthetic rubbers, thermosetting and thermoplastic cellulose acetates, vinyl resins and other synthetic materials. It is finding new uses in the reclamation of waste materials.

8 ADVANTAGES OF THE BANBURY MIXER

1. Produces better quality stocks, more uniformly mixed.
2. Will often pay for itself in a year or less through savings in power, labor and other costs.
3. Requires no skill on the part of the operator, simply attention to a prescribed routine.
4. Needs less floor space for an equal output.
5. Reduces formula costs because of its ability to produce satisfactory mixes from cheaper materials.
6. Permits more efficient and cheaper handling of materials.
7. Provides safer and cleaner working conditions.
8. Facilitates supervision and operating control.

In design and applications the Banbury is keeping pace with developments that are essential to victory and that will contribute much to the necessities and comforts of life when victory is won.

Our Bulletin No 171 describes the Banbury Mixer in detail—its design and construction, capacities of various sizes, operating advantages, etc. A copy will be sent on request. For information regarding new machines or new applications write to our nearest office.

FARREL-BIRMINGHAM COMPANY, INC.
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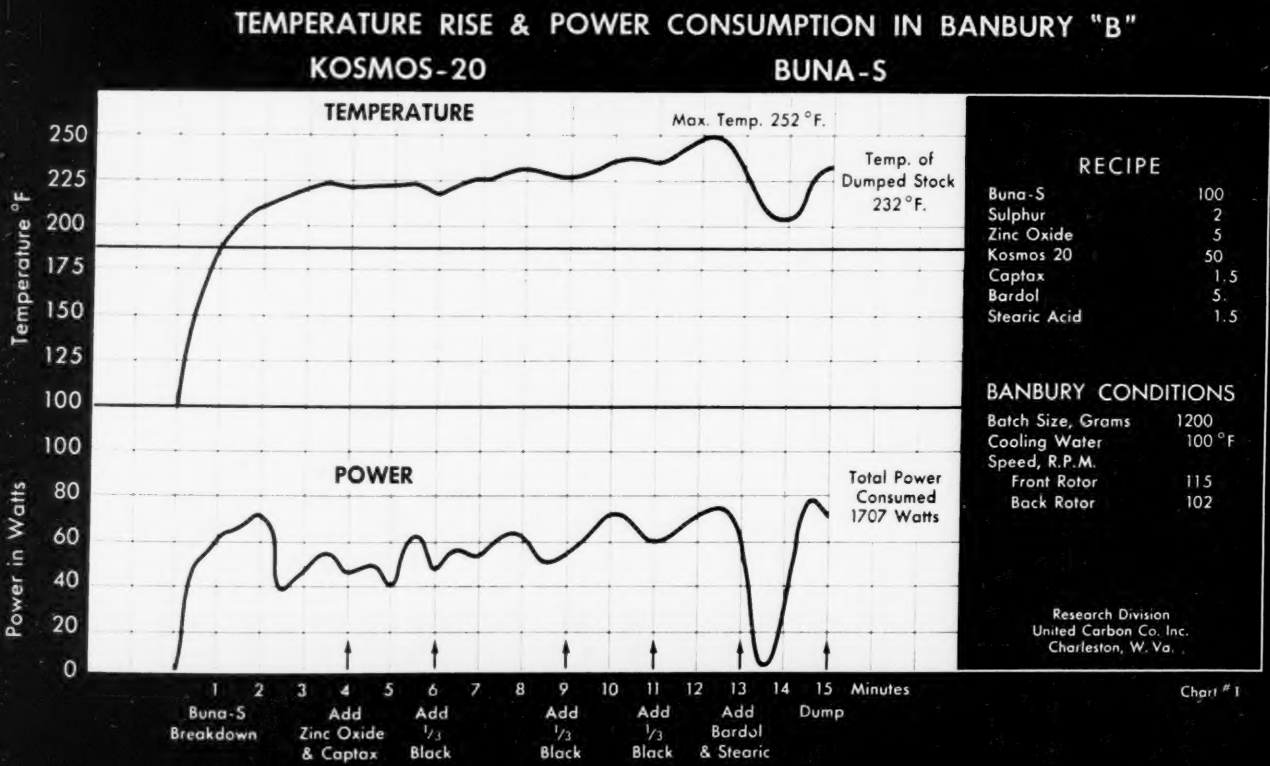


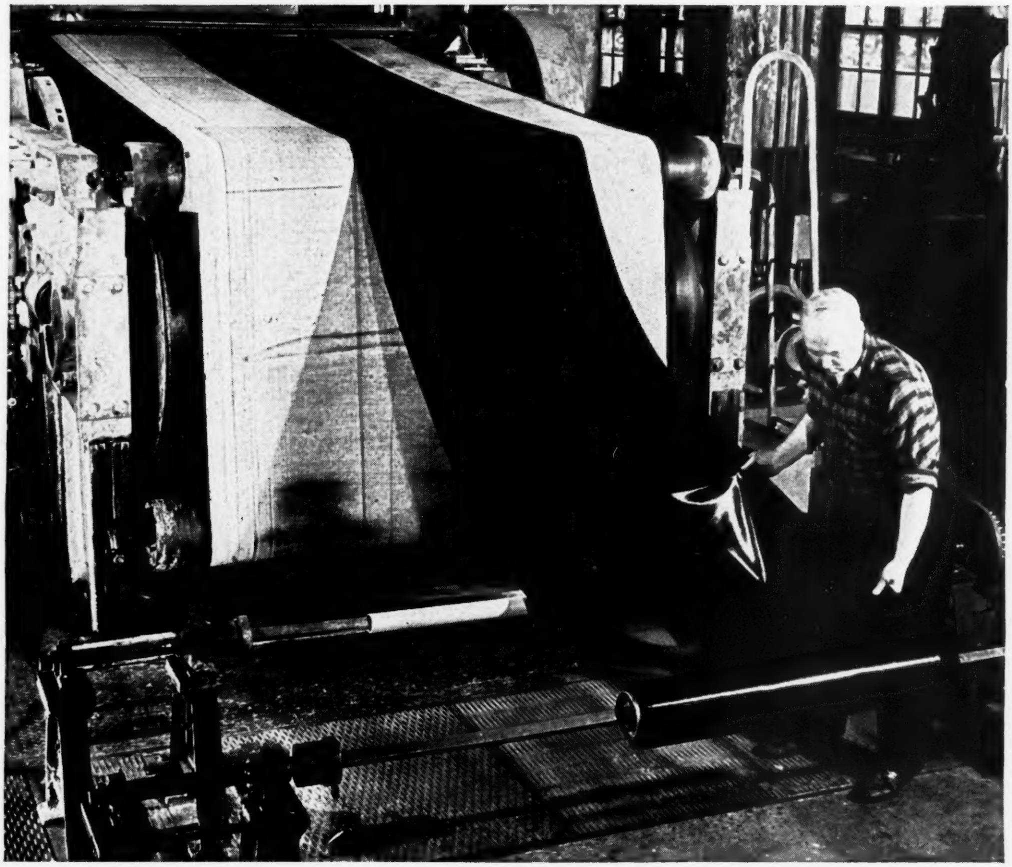
This is the first of a series of charts depicting the temperature rise and power consumption of UNITED BLACKS in Buna S when mixed in a Banbury.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

CHARLESTON, W. VA.

1



Synthetic Rubber "Wallpaper"

FOR UNCLE SAM'S UNDERGROUND OIL TREASURIES

"YOU can't store light oils and gasoline in concrete tanks," said precedent. "Oh, yes, you can," said the Navy. *And they did.*

Today, whole tank farms are now in use — underground and camouflaged. Now tremendous vaults holding as much as 100,000 gallons are storing precious fuels…all through the development of an oilproof "wallpaper" made of Thiokol* synthetic rubber.

You see, concrete is highly alkaline. In contact with aviation gasoline, these alkalies cut the fuel's all-important octane rating. Too, concrete is porous — allows precious fuel to escape.

Working closely with the Navy, the Boston Woven Hose and Rubber Company perfected a thin sheet of Thiokol synthetic rubber. This is welded to the walls and floors of the tanks with a special synthetic rubber cement. Every square inch is covered. The fuel never touches concrete. The octane rating stays up and the fuel stays in.

Valuable information on hundreds of interesting applications of Thiokol synthetic rubber is available to any American manufacturer doing war work. Ask us for it.

Thiokol Corporation, Trenton, N. J.

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Thiokol*

SYNTHETIC RUBBER

"America's First"


. . . FABRICS DESTINED for BATTLE
Specify
Mt. VERNON

August, 1943

VOLUME 108 NUMBER 5

A Bill Brothers Publication

INDIA RUBBER WORLD

CONTENTS

DEPARTMENTS

MARKET REVIEWS

STATISTICS

ARTICLES

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INDIA RUBBER WORLD

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"The Second Mile"[1]

The 1943 Goodyear Lecture

L. B. Sebrell[2]

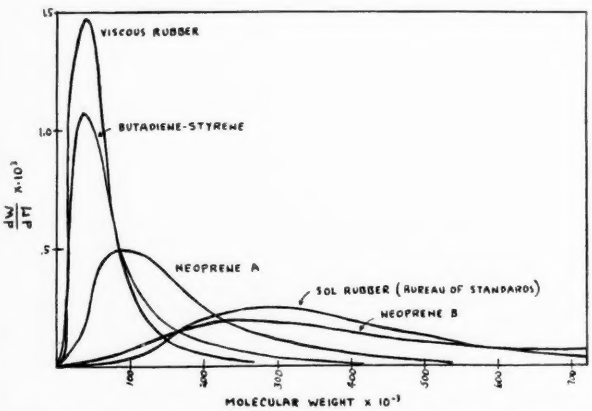


Fig. 9. Molecular Weight Distribution of Natural and Synthetic Rubbers

THE 1943 Goodyear Lecture, because of its length, is being presented in three installments. A continuation of the discussion of molecular weight determinations of synthetic rubbers, which was the last subject covered in the first installment appearing in our July issue, follows. EDITOR.

MOLECULAR WEIGHT DISTRIBUTION. The molecular weight distribution obtained at du Pont by ultracentrifuging a chloroform solution of the butadiene-styrene rubber is shown in Figures 9 and 10. This particular sample is somewhat richer in extremely low molecular weight material than other butadiene-styrene rubbers tested.

Before the ultra-centrifuge data had been obtained, our laboratory had investigated available methods of obtaining approximate molecular weight distributions. Our object was not to obtain very precise distribution curves, but to develop a rapid, convenient procedure which would permit a study of the changes in relative amounts of low, intermediate, and high viscosity fractions with change of polymerization conditions and of mechanical treatment of the rubber.

[1] Presented at the A. C. S. spring meeting at Detroit, Mich., April 15, 1943.
[2] Manager, research and new products, Goodyear Tire & Rubber Co., Akron, O.

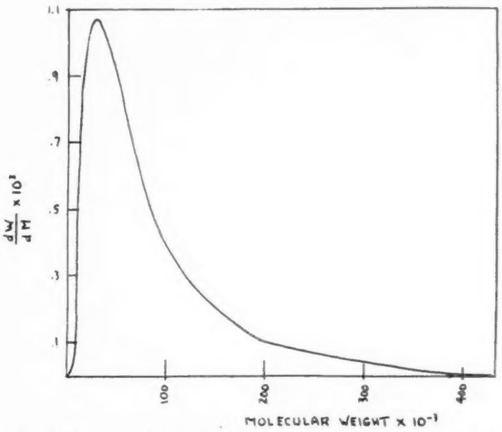


Fig. 10. Molecular Weight Distribution of Butadiene-Styrene Polymer

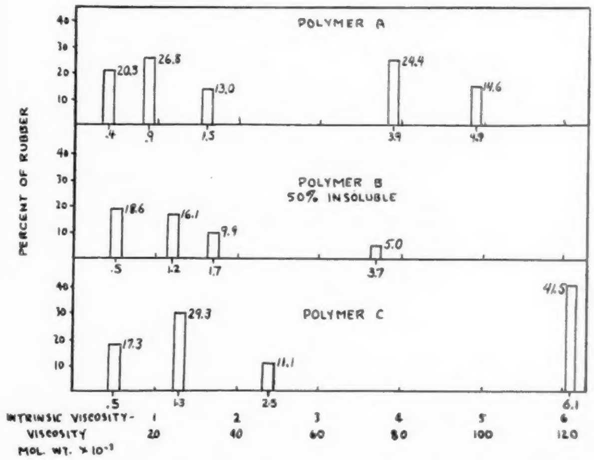


Fig. 11. Results of Fractional Extraction of Butadiene-Styrene Rubbers

The following method was adopted for this purpose: A sample is extracted (by the same method described for benzene solubilities) with a poor solvent, and the amount and relative viscosity of the extracted polymer determined. This extraction is then repeated on the undissolved polymer, using progressively richer blends of the poor solvent with a good solvent. The solvents used for the butadiene-styrene polymers were petroleum ether (30-60° C.) and benzene. As is shown in Table 1, it is sometimes necessary to use alcohol-petroleum ether blends for the first fractions if the sample is especially rich in low molecular weight polymer. The data for Polymer A in Table I and Figure 11 indicate the results of our fractionation of a por-

tion of the batch from which the sample submitted to du Pont was taken. Similar fractional extraction data are shown for other butadiene-styrene rubber samples to indicate the different types of distribution obtained.

TABLE 1. "SUCCESSIVE" FRACTIONAL EXTRACTIONS OF BUTADIENE-STYRENE POLYMERS

Sample	Solvent Blend (Vol. %)		% of Total Rubber Hydrocarbon	Intrinsic Viscosity	Calculated Viscosity Mol. Wt.
A	80/20	P. E./EtOH	5.1	0.33	6,500
(9% non-rubber)	100	P. E.	15.2	0.46	9,000
	95/5	P. E./benzene	26.8	0.92	18,000
	93/7	P. E./benzene	13.0	1.53	30,000
	91/9	P. E./benzene	24.4	3.92	77,000
	90/10	P. E./benzene	14.6	4.85	95,000
B	100	P. E.	7.8	0.42	8,000
(6% non-rubber)	95/5	P. E./benzene	10.8	0.56	11,000
50% insoluble	91/9	P. E./benzene	16.1	1.23	24,000
	89/11	P. E./benzene	9.9	1.75	34,000
	86/14	P. E./benzene	5.0	3.74	73,500
C	100	P. E.	7.7	0.49	9,500
(9% non-rubber)	95/5	P. E./benzene	9.6	0.52	10,000
	91/9	P. E./benzene	29.3	1.28	25,000
	89/11	P. E./benzene	11.1	2.47	48,000
	86.5/13.5	P. E./benzene	29.5	6.05	118,500
	38/62	P. E./benzene	12.0	6.24	122,000

P. E.=petroleum ether.

It may be observed that in the cases where high viscosity fractions were found, no fraction of intermediate average viscosity was found. These data do not indicate the absence of the intermediate material, but that the solvent blends, sufficiently rich in benzene to dissolve the intermediate portion, also extract the very highest. That is, the sensitivity of the fractionation is less than in the low molecular weight range. Since this method of fractionation gives cuts which are still quite heterogeneous, the data are to be used only for comparative purposes. The separation is not sufficiently precise to warrant drawing complete distribution curves.

Since the successive extraction of the polymer samples by several solvent blends is time consuming (about a week is required for each complete determination), a rapid method has been tested by which a fractionation is completed in less than 24 hours. It had been observed that the viscosities for the fractions of butadiene-styrene rubbers were additive, and that a good agreement was found between the intrinsic viscosity (or calculated molecular weight) calculated from the amount and viscosity of the separate fractions, and the value obtained by a viscosity determination of the solution of the entire unfractionated rubber. This relation suggested fractional extraction by the following method: Several duplicate samples of the rubber are extracted for 16 hours with a series of petroleum ether-benzene blends of the same compositions used in successive extractions. The amount and viscosity of the rubber extracted by each blend is determined, and the amounts and viscosities of the individual fractions are calculated from those of the combined fractions actually measured. For our purposes the agreement between this "simultaneous" extraction and the more valid "successive" extraction was highly satisfactory. The agreement is shown in Table 2, in which the various fractions are combined as shown.

TABLE 2. COMPARISON OF "SUCCESSIVE" AND "SIMULTANEOUS" METHODS OF FRACTIONAL EXTRACTION OF BUTADIENE-STYRENE POLYMERS

Calculated Viscosity Molecular Weight	% of Total Rubber Hydrocarbon	
	Successive Method	Simultaneous Method
< 12,000	20.3	17.2
12,000–30,000	26.8	30.8
30,000–60,000	13.0	15.9
60,000–85,000	24.4	24.6
> 85,000	14.6	10.9

EFFECT OF MILLING UPON SOLUBILITY AND VISCOSITY MOLECULAR WEIGHT. The tests of solubility and viscosity must be made upon a sample of known history in regard to the amount of mechanical working which the sample has received. The data in Table 3 show the effect of milling upon the benzene solubility and viscosity of butadiene-styrene rubbers of varying solubilities in the unmilled condition.

TABLE 3. EFFECT OF MILLING ON BENZENE SOLUBILITY AND CALCULATED VISCOSITY MOLECULAR WEIGHT OF BUTADIENE-STYRENE POLYMERS

Sample	No Treatment		Milled 5 Minutes on Tight Set, 6-Inch Laboratory Mill at 80° F.	
	% Soluble in Benzene	Calculated Viscosity Molecular Weight of Soluble Portion	% Soluble in Benzene	Calculated Viscosity Molecular Weight
A	100	50,000	100	37,000
B	100	47,000	100	39,000
C	67	20,000	100	31,000
D	55	20,000	100	39,000
E	59	19,000	100	38,000
F	37	19,000	100	32,000
G	31	15,000	100	27,000
H	43	14,000	100	29,000
I	20	——	100	25,000*

* Required 15 minutes to solubilize.

It may be seen that all samples tested could be milled to complete solubility, but that the viscosity of the rubber after milling to complete solubility is lowest for polymers of low original solubility. The viscosity of rubbers originally 100% soluble is likewise shown to be lowered by milling.

Since any application of the rubber must involve milling of the crumb or massed sheet polymer, our test now measures solubility before and after standardized milling and the viscosity after milling.

INTERPRETATION OF TESTS. It has recently been pointed out by Dr. Baker of the Bell Telephone Laboratories that the described method of determining polymer solubilities (which has been used in several laboratories) may include as "benzene soluble," polymer which is colloidally and not molecularly dispersed. Regardless of the exact nature of the solutions obtained, the methods described have been very useful in the evaluation of the effect of polymerization variables upon the quality of the rubber produced. They have been applied to the study of reaction temperature, catalyst and modifier concentration, polymer yield, emulsifier type and other variables of the reaction.

Electrical Properties of Synthetic Rubber

The electrical properties of synthetic rubbers can be fairly well anticipated from their chemical constitution and the known principles and theories of dielectrics (18). In general, hydrocarbons show low dielectric constants and losses, with electrical properties insensitive to temperature. In accordance with this, butadiene-styrene rubbers, polyisobutylene, and Butyl rubber have excellent properties as electrical insulators. Any electric power absorption observed for these uncompounded rubbers almost certainly can be attributed to traces of impurities or moisture absorption due to impurities. To this extent there is a field of application here for synthetic rubber in which it is not fundamentally at any disadvantage to natural rubber.

TABLE 4. RESULTS OF ELECTRICAL MEASUREMENTS

Type of Rubber	1 Kilocycle Frequency		1 Megacycle Frequency	
	Dielectric Constant	Power Factor (%)	Dielectric Constant	Power Factor (%)
Natural	2.69	.271	2.52	.695
Butyl	2.38	.302	2.20	—
Butadiene-styrene	2.70	.342	2.49	1.02
Butadiene-acrylonitrile	12.65	5.73	11.0	25.9

For compounded stocks of these hydrocarbon rubbers, the electrical properties will be almost entirely determined

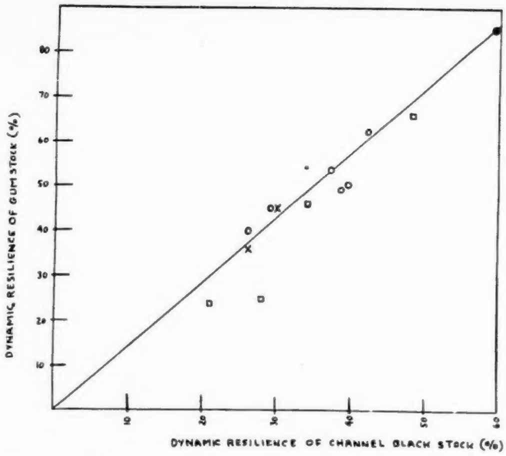


Fig. 12. Relation in Dynamic Resilience between Channel Black and Gum Stocks

Starting Ratio for Polymer

	Butadiene	Acrylonitrile		Butadiene	Styrene
	50	50		75	25
○	70	30	●	Natural Rubber	

by the ingredients which it is found necessary to add to secure desirable physical properties. Since these hydrocarbon rubbers are so inactive electrically, at least for frequencies up to a few megacycles, electrical measurements on them require the very highest degree of precision, are influenced by traces of impurities, and in this range afford little insight into the structure.

The electrical properties of butadiene-acrylonitrile rubbers are less interesting from a technical standpoint because they are so poor. They have a considerable degree of scientific interest because they can be used to study the molecular structure of the polymer in respect to the movement of segments of the chain molecules under the action of an alternating electric field.

For the butadiene-acrylonitrile rubbers, there are polar groups attached to the long-chain molecules. These attempt to aline themselves to an applied electric field so that, in case of an alternating field, molecular rotations occur, and power is absorbed owing to the internal viscosity.

In addition to this type of power absorption, due to dipole rotation, there are undoubtedly other losses due to mechanisms such as ionic conduction since the direct current resistivities of the butadiene-acrylonitrile rubbers are relatively low (19).

Table 4 gives typical results of electrical measurements on gum stocks of natural rubber, several hydrocarbon synthetic rubbers, and a nitrile rubber. The measurements were made in the Goodyear laboratories by R. B. Stambaugh using General Radio audio- and radio-frequency bridges.

Comparison of Synthetic Rubbers in Vibration

In the paper from the research laboratories of the Goodyear company given before the S.A.E. meeting in Detroit in January, 1941, a method of determining the hysteresis and internal friction of rubber stocks was described. The application of this method to synthetic rubber has been extended to give the comparison between natural rubber and the synthetic rubbers which are under discussion in this paper. The measurement of synthetic rubbers, when subjected to a vibratory driving force of known magnitude, offers a convenient and accurate method of evaluating the stiffness and resilience for small deformations such as occur in many important applications. The technique

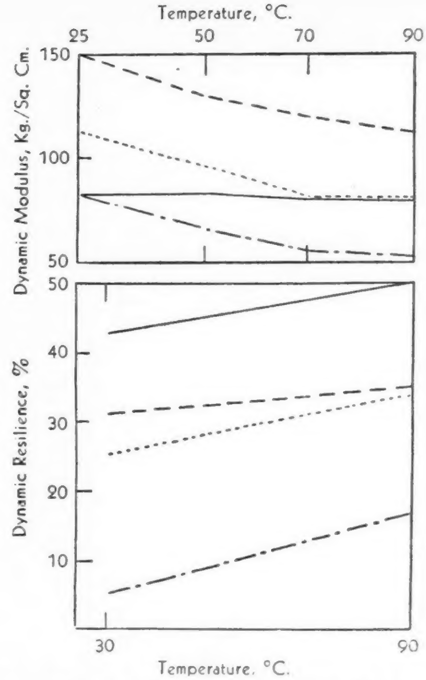


Fig. 13. Effect of Temperature on Dynamic Modulus and Dynamic Resilience of Various Channel Black Stocks

Natural Rubber
Buta. N.
Buta. S.
Butyl

has been described in previous papers (13, 20, 21).

Although it is general practice in testing the physical properties of synthetic rubber to use a test formula containing gas black, it seemed worth while to determine whether vibration measurements on gum stocks might not give a more fundamental comparison of the elastic properties of the polymer itself. By systematic variation of the conditions during polymerization, a series of butadiene-acrylonitrile rubbers was prepared which showed a wide range in dynamic resilience. These were tested when compounded as gum stocks and when compounded as tread stocks. The results are shown in Figure 12. There is an essentially linear correlation between the resilience of the tread stocks and the gum stocks. The straight line shown was drawn between the origin and the point for natural rubber. The points for the three copolymers examined fall so near to the straight line that for most purposes it can be assumed that the relative values for the gum stocks persist after the addition of gas black. Furthermore it can be inferred that carbon black reenforcement affects the resilience of both natural and synthetic rubbers in the same way and by essentially the same mechanism. The general rule appears to be that 40 parts of gas black in 100 parts of polymer cause a 40% decrease in the resilience from the value for the gum stock.

It is advantageous in comparing the properties of various synthetic rubbers to include measurements over a range of temperature since, in many cases, the properties change much more rapidly with temperature in the operating range than do those of natural rubber.

Figure 13 shows the dynamic modulus for tread stocks of natural, Butyl, butadiene-styrene, and butadiene-acrylonitrile rubbers against the temperature for a range from room temperature to 90° C. The effect of temperature in this range on the dynamic modulus of natural rubber is

much less than for the other rubbers. At lower temperatures the dynamic modulus for natural rubber would also begin to show a large temperature dependence. The curves illustrate a fundamental difference between these synthetic rubbers and natural rubber which can be expressed by saying that the temperature range in which they exhibit rubber-like properties is shorter than for natural rubber and is shifted to higher temperature. There are some reasons for supposing that this is analagous to the difference between rubber and gutta percha and is related to an essentially *trans* form of the chain molecules for synthetic rubbers as compared to the *cis* form for natural rubber.

Figure 13 shows the dynamic resilience of these same tread stocks vs. temperature. The superior resilience of natural rubber is plainly shown. The nitrile and styrene rubbers had about the same resilience, which was considerably lower than for natural rubber. The Butyl rubber stock was even lower.

Measurements were made by means of a thermocouple of the temperature rise in the center of one-by-one-by-two-inch blocks of these stocks when subjected to 60-cycle-per-second vibrations of fixed amplitude in the lengthwise direction, using a large flexometer operating on the same principle as the small vibrator employed for the previous measurements. The results are shown in Table 5. Again, the superiority of natural rubber is plainly evident. The lower dynamic modulus of Butyl rubber helps to counteract the effect of its low resilience in this test so that the observed temperature rise is not so much greater than for the other synthetic rubbers.

TABLE 5. COMPARISON OF SYNTHETIC RUBBERS IN FLEXOMETER TEST (STATIC COMPRESSION, 6%)

Type of Rubber	Temp. Rise at °C. at Amplitude of: 1/16-In.	3/32-In.
Natural	49.5	70.5
Butyl	78.5	102.5
Butadiene-acrylonitrile	77.0	96.0
Butadiene-styrene	71.5	90.5

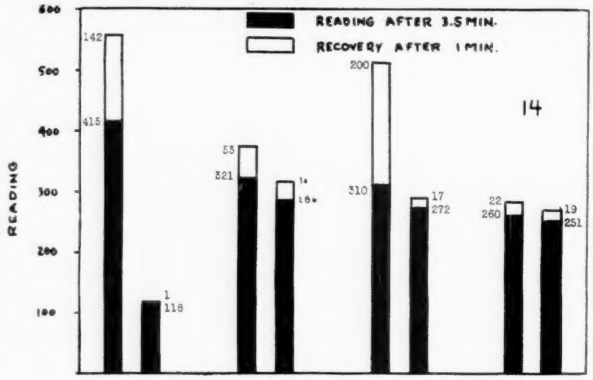
Chemical Unsaturation

In a paper which he gave at the September, 1942, meeting in Buffalo (22), Dr. Cheyney set forth his findings regarding chemical unsaturation. Briefly, he found that the unsaturation, as measured by the iodine chloride method, gave approximately 90% of the amount which would be expected of a straight lineal copolymer, rubber being considered as 100% on the same basis.

Comparison of Physical Properties

Turning now from the purely scientific aspects of the synthetic rubber problem to the more practical aspects of the commercial utilization of the various types of synthetic rubbers, the following section will deal with the comparative physical properties of synthetic rubbers made from butadiene-styrene and butadiene-acrylonitrile and a copolymer known as Butyl rubber in a standard series of formulae. Formulae for the three synthetic rubbers compared with natural rubber are given in Table 6, both for compounds containing no carbon black and for those containing substantial amounts of black.

We do not contend that these formulae represent the maximum properties to be obtained with the synthetic rubbers since everyone may have his own particular opinion as to what constitutes the best type of compounding to be used. However it is believed that the results which are outlined in the succeeding pages are substantially representative of the general properties of the rubbers under consideration.



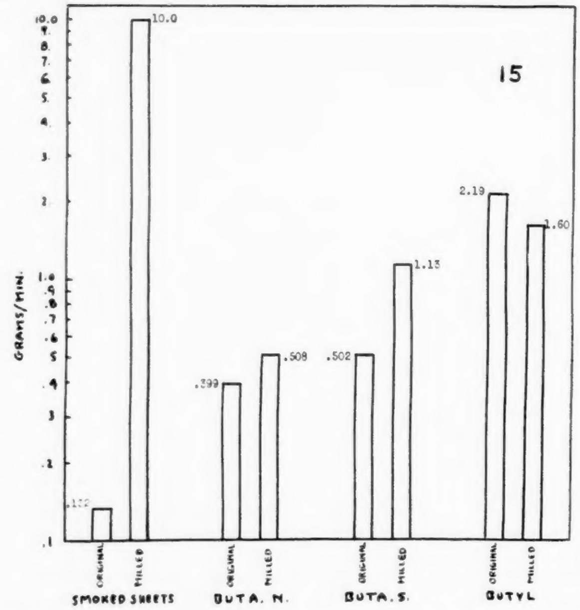


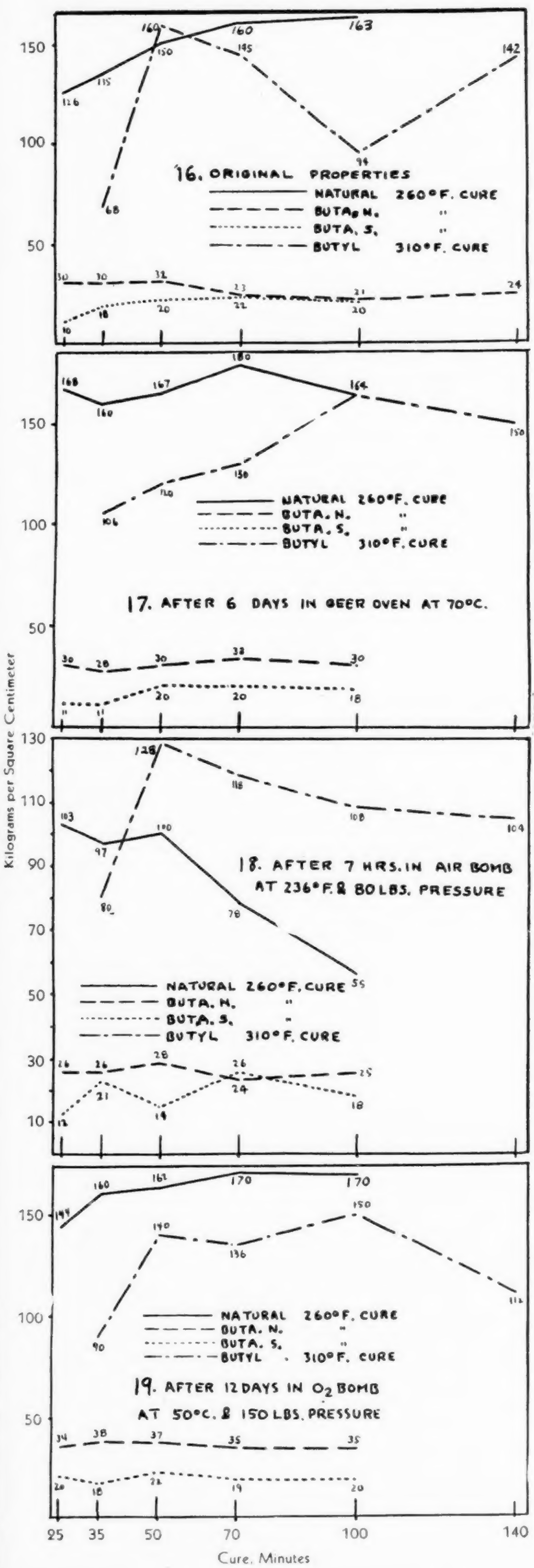
Fig. 14. Effect of Milling on Plasticity and Recovery of Various Rubbers (10 Kg. Weight, 70° C., 15-Minute Preheat)

Fig. 15. Effect of Milling on Extrusion Characteristics of Various Rubbers at 200 Pounds per Square Inch and 92° C.

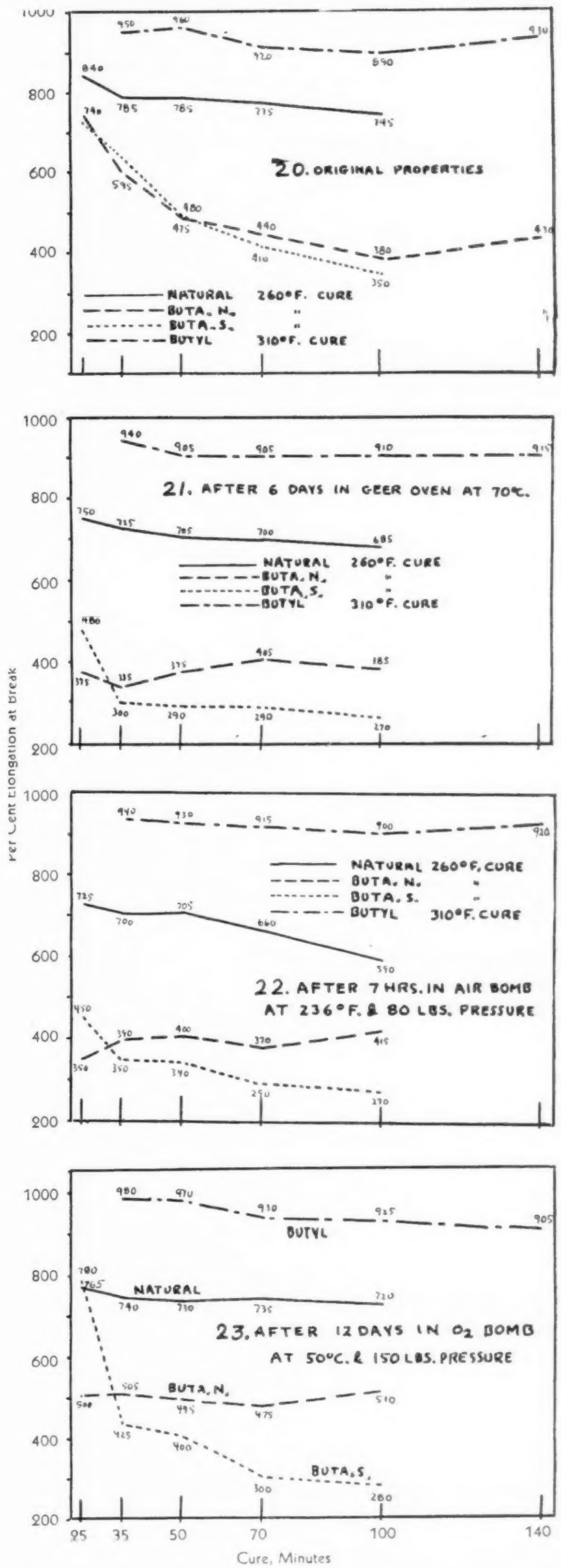
TABLE 6. FORMULAE FOR GUM AND TREAD COMPOUNDS

	Natural	Buta. N.	Buta. S.	Butyl
Gum compounds				
Smoked sheets	100.0	....	....	....
Buna N	....	100.0	....	....
Buna S	....	....	100.0	....
Butyl B	....	....	....	100.0
Captax	0.5	1.0	1.0	....
Tuads	....	....	....	1.0
Sulphur	3.0	2.0	2.0	1.5*
Zinc oxide	5.0	5.0	5.0	5.0*
Stearic acid	1.0	1.0	1.0	3.0
Phenyl-α-naphthylamine	....	1.5*	1.5*	....
Phenyl-β-naphthylamine	....	1.5*	1.5*	....
	109.5	112.0	112.0	110.5
Tread compounds				
Smoked sheets	100.0	....	....	....
Buna N	....	100.0	....	....
Buna S	....	....	100.0	....
Butyl B	....	....	....	100.0
Captax	1.25	1.5	1.5	....
Tuads	....	....	....	1.0
Sulphur	3.0	2.0	2.0	1.5*
Zinc oxide	5.0	5.0	5.0	5.0*
Channel black	50.0	50.0	50.0	60.0
Stearic acid	3.0	2.0	2.0	3.0
Phenyl-α-naphthylamine	....	1.5*	1.5*	....
Phenyl-β-naphthylamine	1.0	1.5*	1.5*	....
Pine tar	3.0	....	....	....
Barrett No. 10	....	3.0	3.0	....
Medium process oil	....	....	....	3.0
	166.25	166.5	166.5	173.5

* Included in the polymer.



Figs. 16-19. Tensile Characteristics of Gum Stocks



Figs. 20-23. Elongation Characteristics of Gum Stocks

Properties of Gum Compounds

Figure 14 represents the effect of milling on the plasticity and recovery of the various rubbers. Two determinations were made: original, after one pass through a tight cold mill; milled, after ten passes through the same mill. While the original plasticity-recovery data show but little difference between the rubbers, the "milled" data show that the natural rubber becomes much more plasticized than the synthetics. The latter give plasticities of the same order under this treatment; all are considerably stiffer than natural rubber. It should be noted that while the drop in plasticity between one and ten passes is about 75% for natural rubber, there is only a 10% decrease for the synthetics.

Figure 15 represents the effect of the same type of milling on the extrusion of the rubbers. The synthetics have high original extrusion-values, but milling completely changes the picture and shows natural rubber to undergo a considerable breakdown, while there is but a slight effect on the synthetics.

The tensile characteristics of the four rubbers considered under the plasticity data, compounded in a pure gum stock, are shown in Figure 16. Cures at 260° F. were run on all compounds except the Butyl, where 310° F. is required to bring out the best physical characteristics. It is, of course, well known that the butadiene copolymers do not develop their best properties in pure gum compounds while Butyl does not compare too unfavorably with natural rubber. Figure 16 shows natural rubber to be far superior to the synthetics. Butadiene-acrylonitrile and styrene are of low quality; while the Butyl rubber is about half way between the two. The curing curve for butadiene-acrylonitrile, styrene, and natural rubber is flat; while Butyl rubber is comparatively slow curing, requiring 50 minutes to reach its optimum.

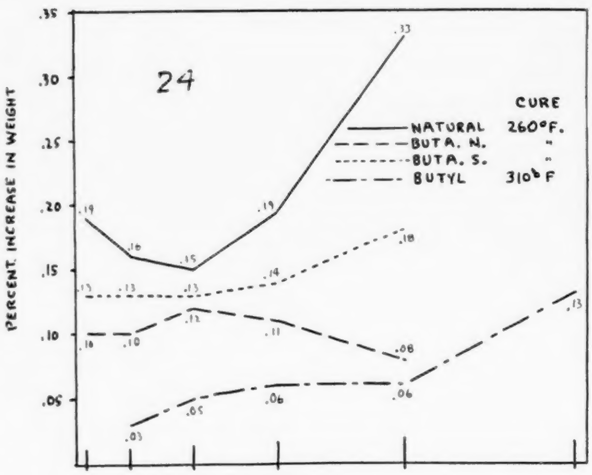
Figure 17 presents the tensile characteristics after aging for six days at 70° C. All compounds age equally well under these conditions; there is but little change from the original properties.

Figure 18 shows the properties after aging in the air bomb for seven hours at 236° F. and 80 pounds air pressure. This test brings out the heat resistant properties of the synthetics. Comparing this chart against the original data presented in Figure 16, it shows that natural rubber falls off decidedly after the 50-minute cure. The properties of Butyl show an improvement rather than a decrease; while the acrylonitrile and styrene butadienes also increase slightly and do not exhibit a falling off over the range.

Figure 19 presents the tensile data after 12 days in the oxygen bomb at 50° C. and 150 pounds' pressure. As in the Geer oven test, there is practically no change over the original properties.

The elongation characteristics of the pure gum compounds before and after various aging tests are given in Figures 20 to 23. Figure 20 shows Butyl to give the highest original elongations closely followed by natural rubber; while the acrylonitrile and styrene rubbers are considerably lower, especially on the higher cures. After six days at 70° C. in the Geer oven there is no change in the elongations of natural and Butyl rubbers; while butadienes acrylonitrile and styrene show a considerable decrease on the low cures, but level off to their original figures after 35 minutes.

Results after seven hours in the air bomb at 236° F. and 80 pounds' air pressure (Figure 22) are of the same order as for the Geer oven data. Butyl and natural rubber are relatively unaffected; while there is a drop on the low cures of the butadienes acrylonitrile and styrene.



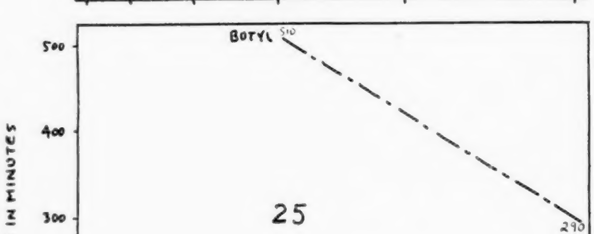


Fig. 24. Weight Increase of Gum Stocks after 12 Days in Oxygen Bomb at 50° C. and 150 Pounds' Pressure

Fig. 25. Flex Life Characteristics of Gum Stocks Stretched 0-116% at 370 Cycles per Minute

Figure 23, representing the effect of 12 days in the oxygen bomb at 50° C. and 150 pounds' pressure on these compounds, shows no change in natural, Butyl, and butadiene-styrene rubbers over the originals; while butadiene acrylonitrile shows an increase in elongation on the high cures.

Figure 24 represents the weight increase by the four gum stocks after 12 days in the oxygen bomb at 50° C. and 150 pounds' pressure. Natural rubber absorbs considerably more weight owing to oxidation under the conditions of test than any of the synthetics. Of the latter, Butyl rubber is the least affected.

Figure 25 shows the relative flexing of the natural and synthetic rubbers in a pure gum stock. The standard punched-hole flexing test was used. This was run at 0-116% stretch at the rate of 370 cycles per minute. Although falling off considerably over the range, Butyl rubber is still outstanding as compared to the others of this group. Natural rubber is superior to the butadienes acrylonitrile and styrene, both of which give very poor results.

(To be concluded)

For Bibliography references see page 500.

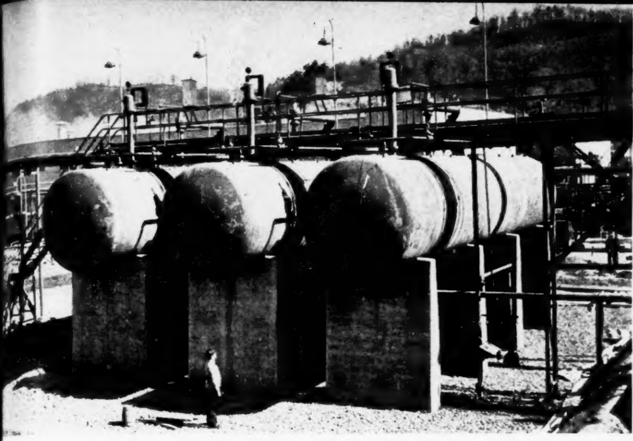


Fig. 19. Butadiene and Styrene Storage Tanks at the Rubber Plant

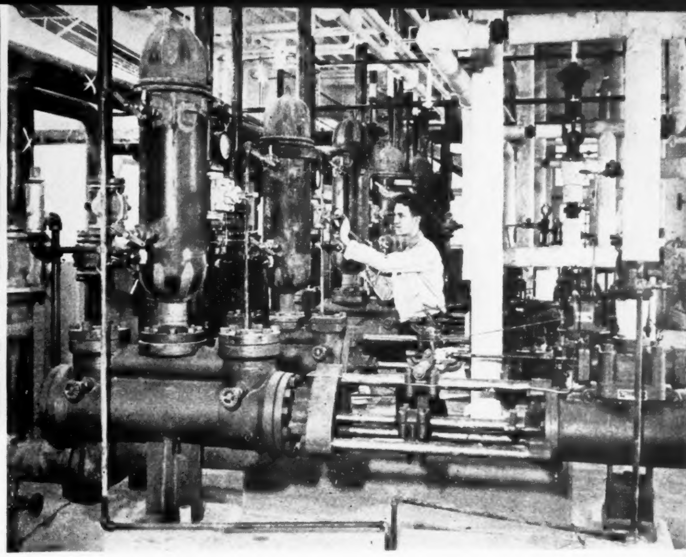


Fig. 20. Pumps for Moving Butadiene and Styrene to Reactors

The Government Synthetic Rubber Plant at Institute, W. Va.—II

R. G. Seaman

FROM the storage tanks of the butadiene and styrene plant, these materials are pumped, as required, to the storage tanks at the adjacent copolymer plant. Nine 30,000-gallon horizontal tanks on concrete supports provide 270,000 gallons of storage space equivalent to 1,458,000 pounds of butadiene, which is sufficient for 72 hours' operation at full capacity. These tanks are also used for recycled butadiene obtained during the rubber synthesis. The tanks are elevated to provide a positive pressure head on the butadiene transfer pumps to prevent vapor lock. Figure 19 shows three of the copolymer plant storage tanks.

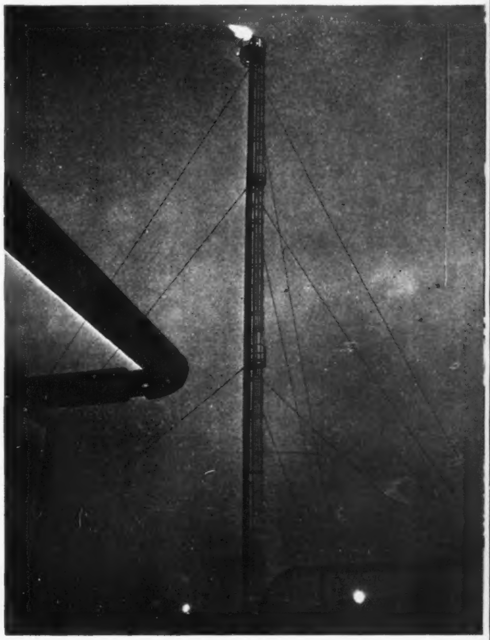


Fig. 21. Safety Flare for Burning Escape Gases at Rubber Plant

Production of GR-S at the Copolymer Plant

Three 30,000-gallon horizontal tanks of the same type are used for storage of styrene in the copolymer plant, all of which are provided with auxiliary equipment for the addition of more inhibitor of polymerization if necessary. Both butadiene and styrene, because of their tendency to

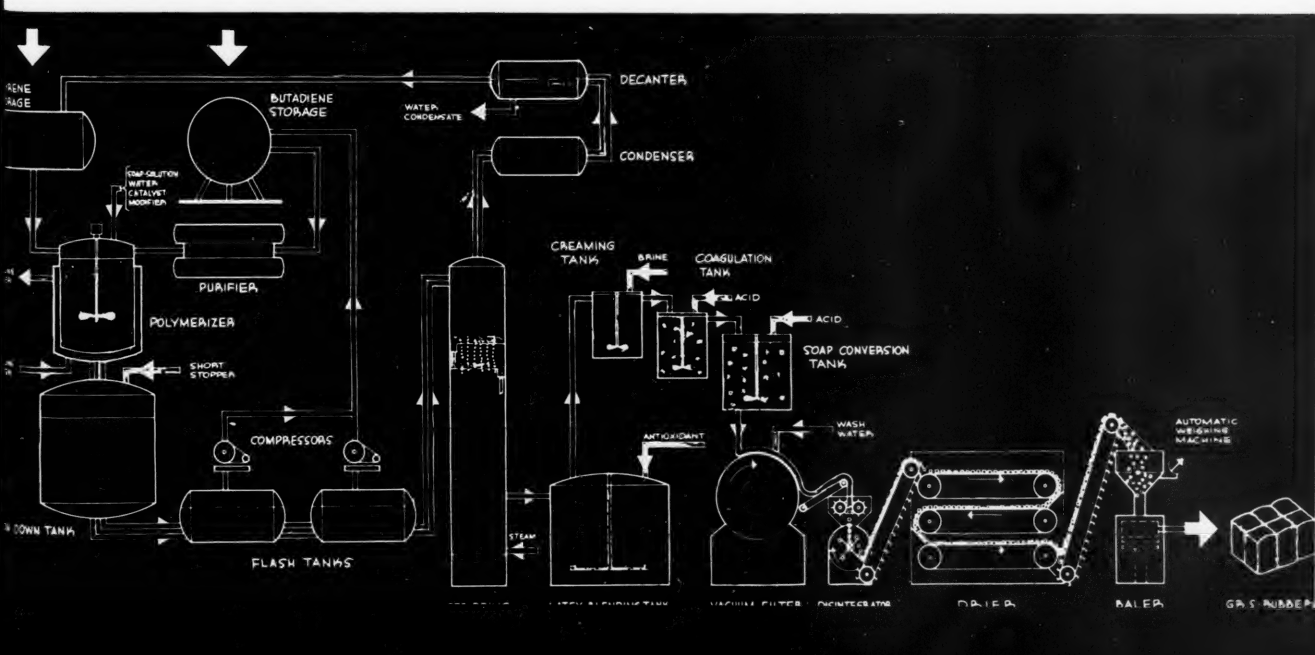


Fig. 22. Flow Diagram of GR-S Rubber Production (Standard Design)

Fig. 23. Tanks for Preparation of Soap and Other Solutions Used

Fig. 24. Part of the Control Room for the Polymerization Reaction

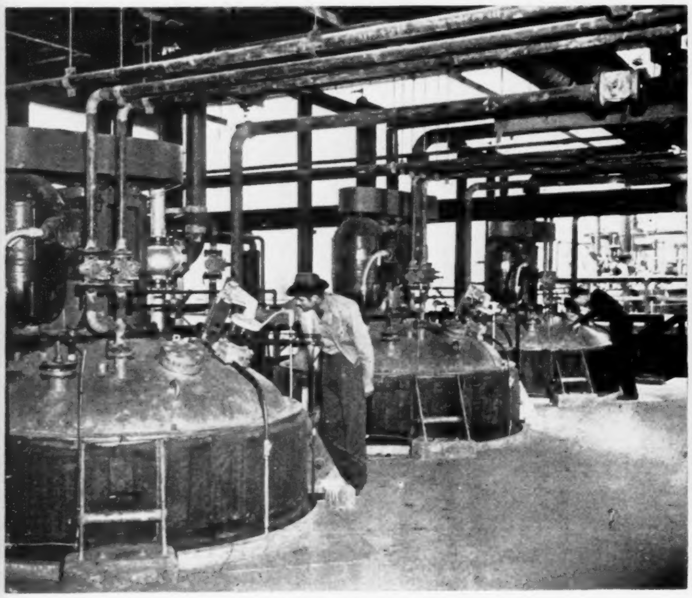


Fig. 25. Reactors in Which Polymerization Takes Place

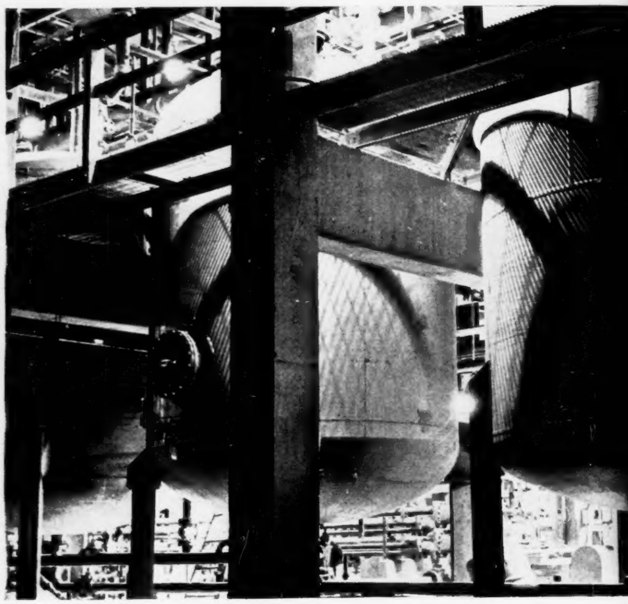


Fig. 26. Blow-Down Tanks Where Polymerization Is Stopped

Fig. 27. Butadiene Condenser in Hydrocarbon Recovery Unit

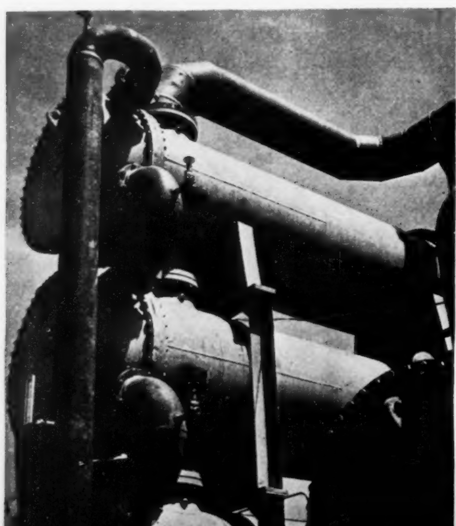
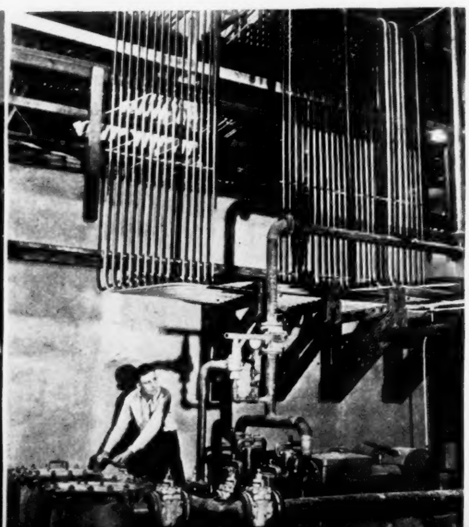


Fig. 28. Concrete Blending Tanks for GR-S Latex



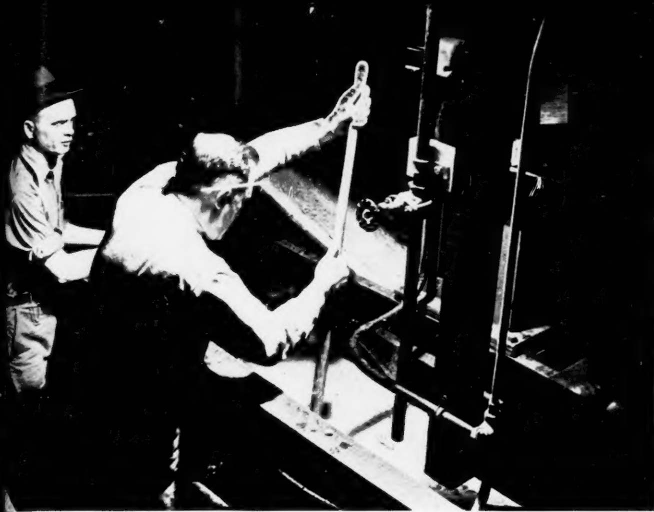


Fig. 29. Part of the Process of Coagulating GR-S Latex

Fig. 30. Washing the GR-S Floc or Crumb

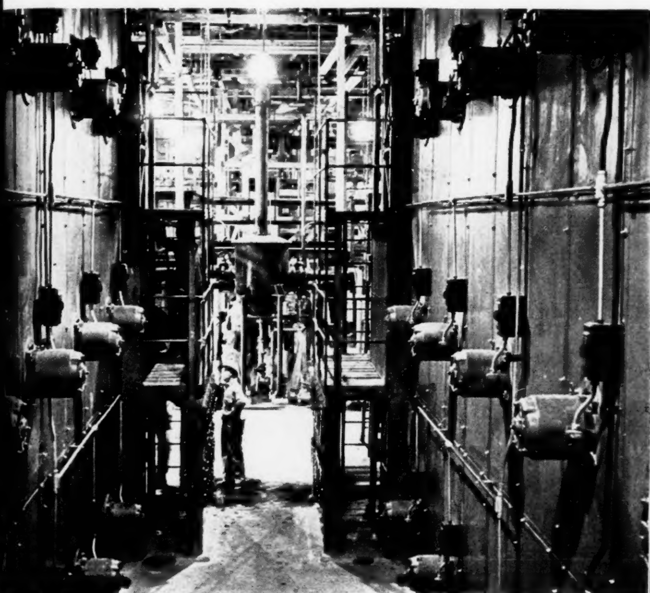


Fig. 31. View of the Driers Which Will Evaporate 160 Tons of Water a Day

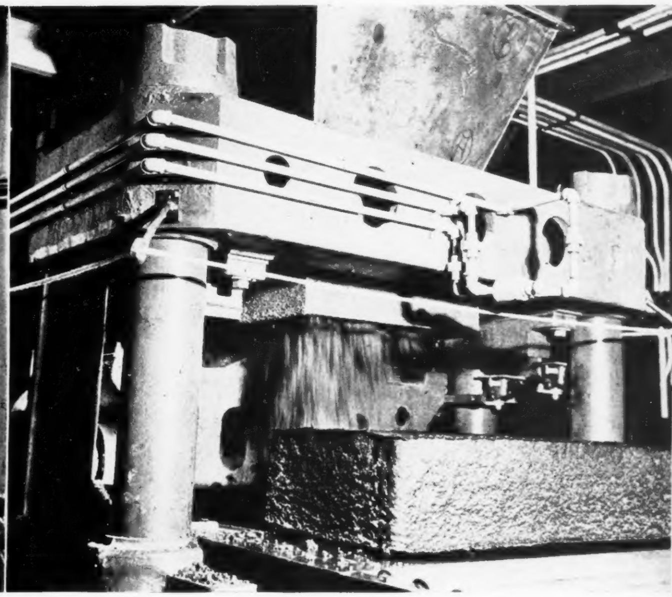
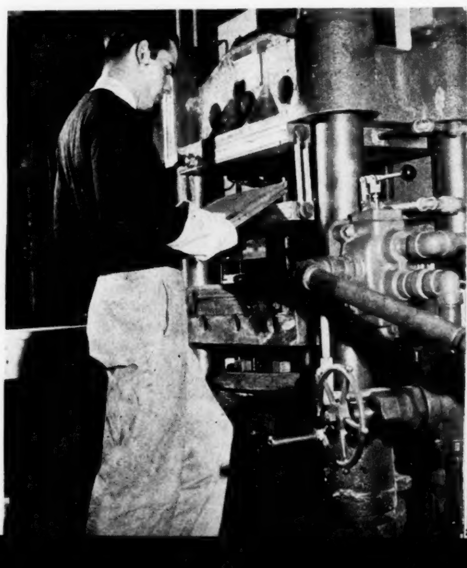
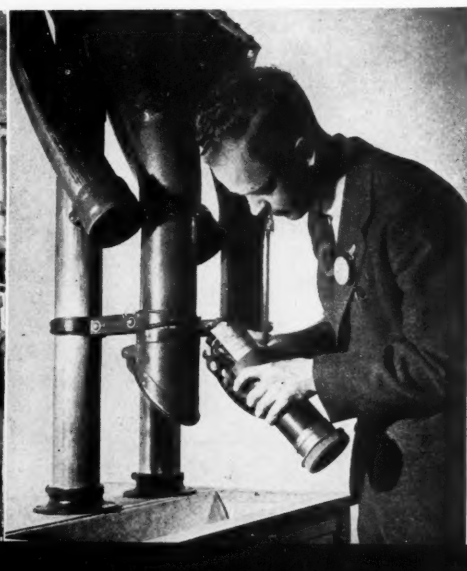


Fig. 32. The Finished Product Coming from the Automatic Baler

Fig. 33. A Press in the Rubber Plant Control Laboratory

Fig. 34. Most Samples Arrive from Plant by Pneumatic Conveyer





polymerize slowly under ordinary conditions of temperature and pressure, are treated with a chemical inhibitor when made, which is removed before the materials are used in the production polymerization.

A large number of pumps are required for transferring butadiene, styrene, and other materials to the various points of use, and Figure 20 is a view of this equipment. Before use in the rubber synthesis, the butadiene is pumped to the caustic soda purification unit where the inhibitor is removed.

All equipment containing butadiene is provided with safety valves which discharge through a collecting system of pipes into a 20-inch main line which terminates in a water seal at the base of a 150-foot stack, 18 inches in diameter. A perpetual flame burns at the top of the stack to ignite combustible materials which may issue from safety valves throughout the plant. Figure 21 pictures this safety flare.

A flow diagram of a copolymer unit is given in Figure 22 and should be of value in visualizing the steps in the process as it is discussed. Before attempting to follow the butadiene and the styrene in their progress through the plant, which results in the delivery from the automatic weighing and baling machines of one 75-pound block of GR-S every 1¾ minutes from each baler, it is necessary to mention the pigment and chemical solution preparation building in which the numerous other ingredients used in the process are prepared. Soap powder to the extent of 13,500 pounds daily for each 30,000-ton unit is made into a solution of the proper concentration here. Water solutions of polymerization catalyst, modifier, and the emulsion of the rubber antioxidant used to protect the finished rubber from deterioration are also prepared in this area. Softened water used in the preparation of the solutions and emulsions is kept in a separate storage tank. The finished ingredients are transferred by means of pumps to the meter room in the reactor area. Figure 23 shows some of the wooden tanks used for the preparation of these ingredients.

Each of the 30,000-ton units is equipped with an interlocked double-set of meters for the preparation of the reaction batch. Most of the necessary materials are pumped through preset meters which discharge directly into the reactors. Two of the ingredients are weighed out on a scale and then transferred by means of pumps to the reactors. Adjoining the meter room is the control room (see Figure 24) where temperature and pressure control and recording instruments for regulating the conditions of the polymerization reaction are housed.

Each of the 30,000-ton units contains 24 reactors of the type shown in Figure 25. The reactor tank is a glass-lined, jacketed vessel equipped with an agitator of special design. Each reactor has its own hot and cold water circulating system for the exact control of the reaction temperature. In order to seal the volatile butadiene against loss from stuffing boxes, a special Durametallic seal which operates on the principle of sliding metallic rings, working under a positive oil pressure of 100 lbs. sq. in., is used around the shaft of the agitators.

When all of the ingredients, i.e., three parts of butadiene, one part of styrene, seven parts of water containing soap, etc., have been metered into the reactors, and the proper conditions of the polymerization reaction adjusted, the copolymerization of the two major ingredients is allowed to proceed for 14 hours at 122° F. It has been found that the most satisfactory GR-S is obtained when the reaction is stopped with 20 to 30% of the butadiene and styrene essentially not polymerized. It is therefore necessary to separate the unreacted raw materials from the

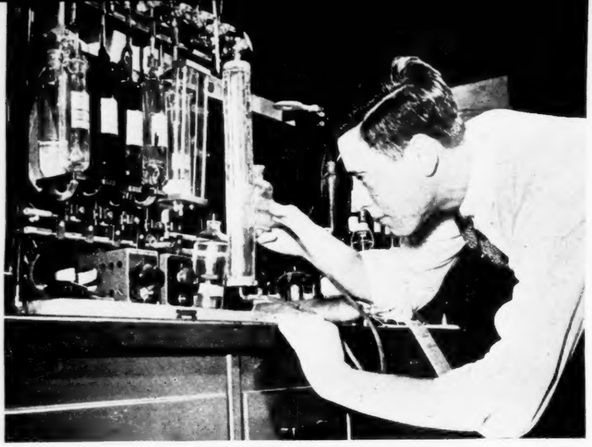


Fig. 35. A View in the Chemical Laboratory

GR-S latex. In order to effect this separation the contents of the reactors are discharged into blow-down tanks of 7,500 gallons capacity (see Figure 26), which function as a holding tank between the reaction step and the hydrocarbon recovery operations. One spare latex tank of the same type is provided for each of 12 reactors to hold material which may require special handling.

The hydrocarbon recovery plant, which is continuous in operation and is automatically controlled by a separate instrument panel, removes the butadiene from the GR-S latex by release of the pressure necessary to keep the butadiene in a liquid state in the flash tanks indicated in the flow diagram (Figure 22), and it is then recovered by cooling it in the condensers shown in Figure 27, followed by recompression. The higher boiling styrene is recovered by vacuum steam distillation in the stripping column (Figure 22), condensed, separated from the water condensate, and returned to storage for reuse.

The GR-S latex containing approximately 25% rubber is mixed with antioxidant and then stored and blended in reenforced concrete vats of 30,000-gallon capacity. Figure 28 shows a part of one of these vats with the pumping equipment used to transfer the latex to the coagulating tanks.

The coagulation of the latex is carried out as a three-step process, as may be seen from the flow diagram. First, by means of a solution of sodium chloride (rock salt) the very fine particles of rubber are built up into larger particles that concentrate on the top of the liquid by creaming action. Then with the proper amount of sulphuric acid, the rubber is flocculated into pieces about an inch in diameter, after which action in still another tank, by the addition of more acid, the soap present in the rubber is broken down to liberate the fatty acid. A view of a part of this process is given in Figure 29.

The coagulated rubber is filtered on large rotary vacuum filters and then washed (Figure 30) to free it from the coagulating materials. It is then conveyed in the form of a blanket to machines which reduce it to smaller particles for drying. The driers are large three-pass machines, as shown in Figure 31. It was stated that for full operation of all three 30,000-ton units, 100,800,000 pounds of water must be evaporated per year.

The dry rubber is fed to an automatic weighing machine, which delivers it to the baler in 75-pound lots. In the baler (Figure 32) the rubber is compressed into rectangular blocks 14 by 28 by six inches in size. In full operation of all units, 12 of these blocks will be delivered every 1¾ minutes. Storage space for three million pounds of rubber is provided.

Laboratory Facilities

The control of the production of 90,000 tons of GR-S will require the analysis of between 1,200 and 1,800 sam-

(Continued on page 463)

Recent Russian Literature on Natural and Synthetic Rubber—II

M. Hoseh

WITH the presentation of this second installment of this series on recent Russian literature on natural and synthetic rubber it has been found necessary to expand the number of code designations to be used to classify the abstracts being given. Therefore, both the old and new designations and the type of subject matter that will be found covered by these designations are listed below:

S — Synthetic Rubber
N — Natural Rubber
M — Compounding Materials
R — Reclaimed Rubber
SN — Natural and Synthetic Rubber

The abstracts will be numbered consecutively under each of these designations and insofar as is possible will follow in chronological order from the original published material.

Determination of Insoluble Residues in Special Types of SK. Z. Ginzburg, A. Dereshinskaya, and I. Kussin, *Kauchuk i Rezina*, 1, 35-37 (1937). **S-11.**

The determination of the content of SK rubber, residue insoluble in benzene, is of importance whether or not the residue can be used for certain purposes. A simple method was found for the determination of residue based on the fact that it remains insoluble even in boiling benzene, where it swells to an average of 50 times its volume. The method consists in boiling the sample for 45 minutes using a three-gram sample and 200-250 millilitres of benzene. The temperature of the heating bath is 115-120° C. Most conveniently is used a $CaCl_2$ solution for this bath. The bulk of the hot solution is first syphoned off through a 140-mesh filter, and the residue is then filtered and washed through a similar mesh. Considering the swelling of the residue in benzene, it is readily seen that a 140-mesh will hold back anything greater than 25-30 microns original size. The residue on the 140-mesh contains no ash. The size of the mesh may vary according to the use for which the residue of the SK is intended. Suction during filtering should be avoided for it will pull through the larger particles.

Utilization of Gases Leaving the Scrubbers in SK Plants. N. Zhuravlev, *Kauchuk i Rezina*, 1, 57-59 (1937). **S-12.**

The waste gases leaving the scrubbers contain valuable components which, if properly utilized, will greatly reduce the cost of production of synthetic rubber. Three ways are suggested for the utilization of these gases hitherto wasted or at the most utilized to a very small degree in the production of ethylene glycol. They are: waste gases can be used as a fuel, for synthesizing ammonia, or for hydrogenation. Assuming a discharge of 2,000 cubic meters of gas per hour and taking the heat content as 4,296 calories per cubic meter, the waste gas is capable to yield 206 million calories per hour, which is equivalent to 29,400 kilograms of coal per hour. There are various ways for utilizing this potential energy, and they can be adjusted to specific needs. It can be used in internal combustion engines, for generating steam or electricity. Rough calculations show that the energy in the gases now wasted per hour is equivalent to 3,400 horsepower or 2,500 kilowatts, or in terms of steam it is equivalent to 3,270 kilograms of saturated steam. When considering the synthesis of NH_3 from waste gases, it may be recalled that the waste gas contains approximately 66% of hydrogen. Also the required nitrogen is a by-product of certain neighboring plants. The gases now wasted are capable of yielding 0.66 metric ton of NH_3 per hour. Finally the hydrogen in the waste gases can be utilized for various hydrogenation processes.

Conditions of Contact, Reaction Mechanism and Types of Reaction Vessels for Polymerizing Acetylene. L. Tsyurikh, *Kauchuk i Rezina*, 3, 3-8 (1937). **S-13.**

An analysis was made of the problem of a reaction between a gas and a liquid. Problems such as the duration of contact, degree of contact, and the mechanism of the reaction are discussed in detail. Several types of commonly used reactions are then analyzed from the point of view mentioned above. Besides mechanical means used to effect contact between the gas and the catalyzing liquid, there are also physico-chemical means which may be utilized for enhancing this contact. In connection with this should be mentioned the addition of surface active substances to the liquid catalyst. These substances either by changing the surface tension of the liquid or by their absorption properties increase the degree of dispersion of the system and thereby effect a more intimate contact between the gaseous and the liquid phase.

Titrometric Method for Determining Higher Diolefins. G. D'yachkov and M. Ermolova, *Kauchuk i Rezina*, 3, 24-27 (1937). **S-14.**

Higher dienes are determined in the presence of olefins or their mixtures, by condensing the diolefin with a standard solution of maleic anhydride in toluene and titrating back the maleic acid. Thus, 0.1-0.4-gram of the unknown is placed together with approximately 10 millilitres of a standard solution of maleic anhydride in toluene into a 20-cubic centimeter glass tube, which is sealed and kept approximately four hours at 95-100° C. The tube is then broken, and its contents are transferred into a separatory funnel where they are washed five times with hot water. The aqueous solution of maleic acid is then titrated with a standard alkaline solution. The hexadiene content is calculated from the formula:

$$x = \frac{0.41(V_1 - V_2)F}{s} \times 100$$

where V_1 is the number of millilitres of 0.1 N base required to neutralize 10 millilitres of the toluol solution of maleic anhydride. V_2 is the number of millilitres of 0.1 N base required to neutralize the excess maleic anhydride after condensation; F is the factor of the 0.1 N base; s is the weight in grams of the sample taken, and x is the percentage of hexadiene in the mixture. This method compares favorably with the hydrogenation

method of analysis. The accuracy of the titrometric method is 0.3%. It is suggested that hydrocarbon fractions containing several diolefin homologs be characterized by maleic acid values analogous to iodine values.

Utilization of Higher Alcohols in Divinyl Rubber. S. L. Talmud. *Kauchuk i Rezina*, 4, 37-40 (1937). **S-15.**

The problem of admixing higher alcohols to natural rubber was investigated by Wiegand.[1] Some of his conclusions are: The higher alcohols do not activate vulcanization and therefore cannot be regarded as substitutes for stearic acid; they improve the dispersion of carbon black in rubber; their softening effect exceeds that of stearic acid; they do not retard vulcanization; in quantities up to 2% they improve the vulcanized product; because of their high cost their use presents an economic question. Owing to the differences in the nature of natural rubber and divinylate polymers, because Zn stearate does not activate accelerators in synthetic rubber and finally because the higher alcohols are a by-product of the Lebedev process for synthetic rubber, the use of higher alcohols in synthetic rubber was investigated. For this purpose the fraction with a boiling point over 150° C. obtained from the residue of butyl alcohol distillation was studied. The high capillary activity of this fraction was tested on several kinds of carbon black. The effect of this fraction was studied on several rubber compounds. The physical and mechanical properties of the vulcanized products were examined, and on the basis of the results the following conclusions are drawn: (1) The fraction having a boiling point over 150° C. obtained from the residue of BuOH distillation is quite suitable for use in divinyl rubber. (2) An addition of 3-7% of this fraction enhances the dispersion of the ingredients, facilitates the working of the compound, and improves the properties of the vulcanized product. (3) Thus the scarce and dear stearic acid in rubber mixtures with divinylate is advantageously replaced by this fraction.

A Study of Accelerators for Hot Vulcanization of Dipped Rubber Articles. V. Fabritsiev, M. Vishnevskaya and M. Seriko. *Kauchuk i Rezina*, 2, 57-60 (1937). **M-1.**

A number of accelerators was tested. They belonged to three groups: xanthogenates, industrial piperidines and dithiocarbamates. The xanthogenates investigated were Zn butylxanthate, Zn isopropylxanthate, K butylxanthate, and isopropylxanthate. Of these the first two are insoluble in water, and the last two dissolve in water. The K and Na xanthates were inferior as accelerators. The vulcanized product obtained with their aid had a tensile strength of 30 kilograms per square centimeter (427 psi) and an elongation at break of 500%. Zn butylxanthate, when used two parts to 100 parts of rubber and a vulcanization period of 80 minutes, gave a product having a strength of 180 kilograms per square centimeter (2,570 psi) and an elongation at the breaking point of 870%. When the amount of this accelerator is increased to three parts, the optimum time of vulcanization is reduced to 40 minutes, and the product has a strength of 260 kilograms per square centimeters (3,700 psi) and an elongation of 850% at the breaking point. Zn isopropylxanthate behaves in a similar way. Of the piperidine group two accelerators were tested: Vulcacite P and Pipsol M-1. The former is pentamethylene piperidinedithiocarbamate, and the other is a condensation product of Vulcacite P with formaldehyde plus an added neutral emulsifier. The optimum vulcanization time is 40 minutes for Pipsol M-1 and 50 minutes for Vulcacite P. The strength of the product is somewhat greater when Vulcacite is used. Of the third group, dithiocarbamates, two were tested: K-43 and K-45. The effectiveness of these two accelerators, not markedly different from each other, was tested with and without activators and promoters. It was found that using 1% of the accelerator and 0.6% of an organic activator gave very good results. The tensile strength was 370-380 kilogram per square centimeter (5270-5400 psi), and the elongation at the breaking point 700-800%.

[1] *Can. Chem. Met.*, 18, 2 (1934).

Effect of Minute Quantities of Metals and Salts on the Aging of Rubber. A. Bobrova. *Kauchuk i Rezina*, 3, 34-47 (1937). **SN-1.**

The effect of small quantities of Mn and Fe salts on aging was tested on both natural and synthetic rubber. The following salts were used in these experiments: MnO_2, MnB_4O_7, $MnSO_4$, $MnCl_2$, $MnCO_3$, Fe_2O_3, $FeSO_4$, $FeCl_2$, and Fe (metallic). The quantities of each of these salts and the metallic iron used in testing were: 0.03, 0.05, 0.08, 0.4, and 0.8% by weight for natural rubber. In synthetic rubber the quantities of the respective salts and metallic Fe were 0.05, 0.2, and 0.8%.

Despite careful cleaning, the sulphur, and the diphenylguanidine used as accelerator still contained some Fe: namely, 0.007 and 0.012% respectively. Thus the use of these two introduced 0.0003% of Fe into the tested samples. Four methods of aging were used: (1) The Geer oven method, 5-10 days at 70° C. (2) Bierer-Davis oxygen bomb method, 1-3 days at 60° C. (3) Storing the specimens for 6-12 months at room temperature. (4) Storing for one year on the roof. The deleterious effect of Mn on natural rubber depends entirely on the chemical combination in which it is present in the rubber. Contrary to the prevailing opinion, even insoluble Mn salts may have a detrimental effect. MnO_2, MnB_4O_7, and $MnCl_2$ are detrimental even in quantities of 0.03%. For these salts this represents 0.0189, 0.009, and 0.014% of Mn respectively. $MnSO_4$ and $MnCO_3$ in amounts of up to 0.05% are not destructive for natural rubber. $MnCO_3$ is the least injurious. With respect to synthetic rubber (tested was butadiene rubber) the Mn salts proved to be inert. Metallic Fe in the amounts tested had no effect on natural rubber. Its addition did not affect the mechanical properties of the vulcanized specimens. $FeSO_4$ lowered the resistance to aging of natural rubber only when it was present in large quantities, and this only at elevated temperatures in an atmosphere of oxygen. In this respect $FeSO_4$ is less active than $MnSO_4$. Fe_2O_3 in amounts of 0.8-2% affected natural rubber adversely. This effect was intensified in an atmosphere of oxygen. $FeCl_2$ is destructive for natural rubber even in minute quantities. The Fe compounds tested were inert to synthetic rubber. Generally the Mn compounds proved many times more detrimental than the Fe compounds. It is thus evident that when testing rubber for the respective metals, not only should the cations be determined, but their chemical combination as well.

A Rapid Qualitative Test for Accelerators. E. Slepushkina. *Kauchuk i Rezina*, 3, 48-51 (1937). **M-2.**

This new method requiring 10-15 minutes enables a qualitative test to be made for the presence of accelerators in raw rubber as well as in accelerator matrixes. The determinations are made predominantly on aqueous extracts. They are based on the solubility coefficient in water of the respective accelerators. Briefly, the tests are as follows. For an accelerator matrix: a 2-3-gram sample is boiled with 15-20 millilitres of water for 5-7 minutes. The

extract is filtered and cooled. To 3-4 millilitres of the cooled filtrate in a tube is added 0.5-millilitre of a solution of cobalt oleinate, $Co(C_{18}H_{33}O_2)_2$, in benzene, and the test tube is shaken vigorously. After allowing it to stand for some minutes characteristically colored rings appeared. Diphenylguanidine is indicated by a violet color; thiuram by a dark green to olive color, and light to green indicates mercaptobenzothiazole. A variation of the preceding consists in adding to the cooled filtrate 1-1.5 millilitres of pure benzene. The tube is shaken and allowed to stand. To the benzene layer is carefully added (dropwise) the Co reagent until a color appears, and the tube is shaken again. This last operation is quite important as the color may change.

If all the three substances are present, i.e., diphenylguanidine, thiuram, and mercaptobenzothiazole, the colors may be masked. The test for mercaptobenzothiazole in such case follows: 10-15 grams of the sample are extracted with acetone in a Soxhlet apparatus for 40 minutes. From the extract the acetone is driven off, and the dry residue is treated with 15-20 millilitres of 25% NH_4OH warming it slightly. The mixture is cooled, and to it are added approximately five grams of NaCl to precipitate any resinous material that may be present. The mixture is then filtered, and to the filtrate are added three millilitres of a 2% $AgNO_3$ solution. A fibrous precipitate indicates the Ag salt of mercaptobenzothiazole. Another test for this accelerator is to reflux 2-3 grams of the sample with 10 millilitres of ethanol for 7-10 minutes. To the cooled filtrate is added the cobalt reagent. The appearance of a green color indicates the presence of mercaptobenzothiazole. To ascertain the presence of diphenylguanidine, to the aqueous extract is added a 1% solution of picric acid. The appearance of a yellow precipitate indicates the presence of diphenylguanidine. An alternate method is to boil a three-gram sample with 15-20 millilitres of 0.5 N HCl for five to seven minutes. The filtrate is then treated as above. Thiuram and mercaptobenzothiazole do not react with picric acid in a HCl solution. To test for accelerators A-19 and K-1 to a cold filtrate of an aqueous extract are added one millilitre of sodium hypochlorite and two millilitres of phenol. The appearance of a bright blue color, sometimes after only three to five minutes, indicates a positive test. This test is sensitive to 0.004-milligram.

For testing rubber the same reactions are used. To make an aqueous extract five to seven grams of finely cut rubber are boiled with 15-20 millilitres of water. If the accelerator is present in quantities of 0.01-0.1% a 30-35-gram sample is taken. For an acetone extract of rubber is used a 10-15-gram sample, and the extraction lasts 45 minutes to one hour.

Raw Materials for Lamp Black. S. Grigorov and V. Aleksandrov, *Kauchuk i Rezina*, 4, 86-92 (1937). **M-3.**

There is an unlimited supply of natural gas in the Soviet Union to provide gas black. However the constantly increasing demand for this product makes it imperative to survey other sources of raw material as well. The following come under consideration as raw materials for lamp black. (1) Petroleum products, including green oil, by-products of benzene, toluene, and xylene, polymers, a by-product of cracking, brown oil, solvents, mazout, etc. (2) Coal tar and its products, including medium oils, naphthalene, anthracene oils, anthracene, phenanthrene, etc. (3) Peat tar and its products. (4) Tar from shale. (5) Waste from fat, oil, tar, and related industries. The properties and advantages and disadvantages of each of these as source of lamp black are discussed in detail.

Determination of Grit in Carbon Black. S. Grigorov and V. Molchanova, *Kauchuk i Rezina*, 92-94 (1937). **M-4.**

Grit in carbon black is commonly determined by passing a weight sample of the tested material through a sieve with the aid of a hairbrush. The residue on the sieve is weighed and taken as grit. This method is not satisfactory because the residue includes not only sand and iron oxides, but oversized agglomerates of carbon black as well. The sand is usually blown in by wind; the iron oxides are derived from corroded burners. To differentiate between carbon black agglomerates and inorganic impurities the following method is suggested. Place a 10-gram sample on a No. 100 (1,600-mesh per square centimeter) sieve and rub it with benzene, using a hairbrush. Continue the washing until the benzene comes through clear. Dry the residue and weigh on an analytical balance. Ignite the residue and weigh again. The grit content is calculated as follows: $x = \frac{a - a_1}{B} \times 100$ where a is the weight of the residue before ignition, a_1 is the weight of the residue after ignition, B is the weight of the sample, and x is the grit content in %.

Reclaiming the Solvent in Regenerating Rubber by the Solution Method. G. Arons, *Kauchuk i Rezina*, 1, 37-48 (1937). **R-1.**

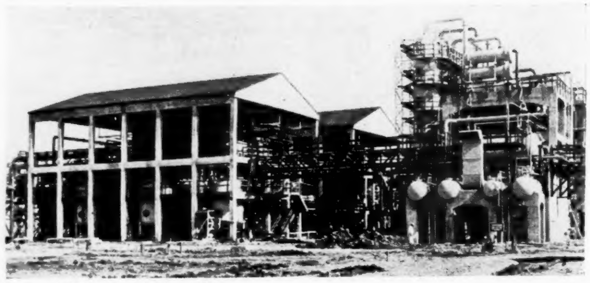
Reclaiming the solvent used in regenerating rubber by the solution method presents considerable difficulties. Arons investigated this problem after making certain assumptions. These were: (1) The solvent is white spirit, and the concentration is one part of rubber to 10 parts of solvent. (2) The heat capacity of rubber is 0.4-calorie per kilogram. (3) The heat capacity of the solvent is 0.53-calorie per kilogram. (4) The gas constant for the solvent is 6.3. (5) The heat content of the solvent's vapor at a temperature is given by $J = [71.5 + 0.335 + 0.0009 (t-15)]t$. (6) The relation between the vapor pressure of the solvent and its temperature is expressed by the Wilson nomogram (a table is given). Two methods for supplying heat to the distilled liquid were investigated: (1) Contact with a hot surface and (2) intimate mixing with a heat carrier such as air or steam. As to distillation procedures the following were examined: (1) Distillation without vacuum in an atmosphere of steam. (2) The same except that the steam was recirculated. (3) Distillation without vacuum in an atmosphere of nitrogen. (4) Direct distillation in vacuo on drying rolls. (5) Vacuum distillation with steam without hot surface contact. (6) Vacuum distillation with steam with a hot surface contact. From the mentioned procedures for distillation were found unsuitable: (1) because of the excessive volume of steam required; (2) because it does not produce the desired results; and (5) because it can be substituted by (6) with greater success. Of the remaining three, (3) is unsuitable because of the bulkiness of equipment it requires. Thus of the examined methods only (4), i.e., vacuum distillation on drying rolls, gives a possible solution to the problem. The article gives formulae and includes calculations.

(To be continued)

1942 PRODUCTION OF SULPHUR IN THE UNITED STATES reached 3,460,686 long tons, 10% above the record of 1941. More than 83% came from Texas, over 16% from Louisiana and the remainder from California and Utah. Besides about 1,600 tons of native sulphur-bearing ore, containing 10 to 50% sulphur, are mined in Colorado and Texas for agricultural purposes.

Rubber after the War—II

K. E. Knorr[1]



General Tire & Rubber Co.

Part of Another Government Synthetic Rubber Plant in Texas

AT PRESENT, large-scale production has only started, and cost considerations characteristic of peacetime production are irrelevant. The present cost structure of the industry, furthermore, is likely to undergo considerable modification with the reconversion of the war economy into a peace economy. Finally, synthetic rubber production and utilization are technologically in constant flux. Price predictions made today are therefore necessarily provisional.

Synthetic Rubber Production Costs

The costs of manufacturing different types of synthetic rubbers differ greatly. The prices of Perbunan, Vistanex, Neoprene, Koroseal and "Thiokol" are over 30¢ a pound, and marked price decreases are not promised. But these are all special-purpose rubbers that find utilization on the basis of quality rather than price. Their relation to natural rubber is complementary rather than competitive. Standard Oil of New Jersey's Butyl, whose raw material isobutylene is gained directly from refinery gases and allows immediate and continuous polymerization, is the cheapest artificial rubber in the field. Including plant amortization, production costs have been estimated at between 10 and 15¢ a pound. Including taxes and dividends, a price of between 15 and 20¢ is indicated. The drawback of Butyl is its not quite satisfactory performance as an all-purpose rubber. According to recent tests, Butyl tires promise a total mileage of about 25,000 under conditions of careful driving at low speeds, as compared with 30,000 miles driving at normal speeds for tires made from natural rubber. Butyl's abrasion resistance is definitely inferior to that of the more expensive Buna S. Whether Butyl will have a chance after the war to displace Buna S and natural rubber in the cheap tire field will depend on the relative development of price and quality differentials as between the three materials. Recently 64,000 tons of planned capacity for Butyl manufacturers was cancelled since isobutylenes are needed badly in the aviation gasoline program.

Seven-eighths of the government construction program is devoted to Buna S, thus far the best all-purpose synthetic. Present selling price fixed by the government is 36¢ a pound for military and 18½¢ a pound for civilian uses. Price predictions for the post war range all the way from 15 to 35¢ a pound. However it seems that the lower quotations do not include depreciation, taxation, and dividend allowances. The majority of forecasts range between 20 and 30¢ a pound under conditions of large-scale production near full capacity.

The raw materials for the manufacture of Buna S, a complicated and expensive polymerization process, consist of about three-fourths butadiene and one-fourth styrene. Butadiene can be derived from several petroleum fractions, from natural gas, from coal and limestone, and from numerous vegetable products such as white and sweet potatoes, wood sugar, turpentine, soy beans, grains, and molasses. The present controversy as to whether butadiene should be made from grain alcohol or petroleum derivatives has, of course, a bearing on the postwar cost-status of Buna S production.

With the petroleum processes, factory operations are extremely expensive and represent about 70% of total production costs. Large-scale manufacture, therefore, tends to decrease heavy overhead costs, and it is claimed that big plants working near capacity will be able to turn out butadiene at from 10 to 13¢ a pound. On the other hand, when butadiene is made from alcohol produced from agricultural products, from 75 to 80% of total production cost is represented by the cost of raw materials. With corn and wheat at present prices, butadiene cannot be produced from grain alcohol at a price anywhere near the price attainable by the petroleum processes. It is estimated that the price of grain must be below 30¢ a bushel if alcohol is to be produced from it at the prewar price of from 15 to 20¢ a gallon.

It is quite possible, especially if the Polish process of Publicker Co. proves satisfactory, that butadiene will be made from alcohol after the war. Alcohol, however, does not necessarily mean grain alcohol. In 1941, 70.4% of our domestic alcohol production was derived from molasses, 23.4% from ethylene from petroleum, and only 5.9% from grain. Comparable percentages of the present production program are about 15, 11, and 75. This large-scale shift to grain alcohol is a result of a shipping shortage that discourages the importation of large quantities of molasses from Cuba and other producing countries. After the war, therefore, there will be a return to blackstrap molasses and ethylene gained from cracked petroleum gases, unless the grain-alcohol process is heavily subsidized by the government. Representatives of the farmer's interest should consider that butadiene production from grains can contribute very little toward the solution of the problem of cereal surpluses by industrial utilization. If an average annual production of, say, 240,000 tons of Buna S were based on grain alcohol, this would require merely 2½% of the country's average production of corn and wheat.[2]

New inventions may alter the picture. The butylene-glycol process investigated by the Department of Agriculture's laboratory at Peoria, Ill., merits special mention. This process dispenses with the alcohol stage altogether. But attempts to improve unit yields of butadiene have thus far been unsuccessful. Further technological

[1] Food Research Institute, Stanford University, Calif.

[2] It is worth remembering that a large proportion of the present alcohol output is produced in converted beverage-distilling plants. After the war these plants will be returned to beverage production, and new facilities would have to be constructed for a vastly increased peacetime production of grain alcohol. The plants that used molasses before the war are located near the Atlantic and Southern seaboard and not in the area producing cereal surpluses.

improvements, moreover, may also cheapen the petroleum processes.

Suppose Buna S can be marketed after the war for about 22¢ a pound, including depreciation, taxation, and a reasonable profit. According to present assumptions, this would require that all production problems are solved satisfactorily and that large plants operate near capacity. How would this compare with the price of natural rubber?

Many experts now predict that the price of Buna S will be equal to that of the plantation product. But they make the mistake of referring to the natural rubber price of 1941 as if this were the normal price. Owing to an abnormally heavy demand, local labor shortages, sharply rising shipping and insurance rates, and the international rubber control that did not allow efficient producers maximum production until the last quarter of the year, the price of natural rubber averaged over 22¢ a pound in 1941. But from 1931 to 1939, the average annual price had ranged all the way from 3.4¢ in 1932 to 19.3¢ in 1937, and over the entire period averaged only 12¢ a pound.

The extremely low price in 1932 was the result of an output capacity much in excess of normal consumption confronted with a sharply contracting demand during the Great Depression. Unless controlled on a compulsory basis, the bulk of the supply of plantation rubber is notoriously inelastic to price declines. The incidence of high fixed costs leads estates to enlarge in the face of declining prices. The majority of Malayan smallholders who live almost exclusively on the sale of rubber tend to follow the same policy. The disastrous price collapse of the early thirties entailed great distress for the rubber plantation industry and could hardly have lasted much longer than it did. Yet it also forced permanent and substantial production economies and showed how severe a price depression the industry is capable of surviving.

From 1934 on, the price of natural rubber was raised artificially by the restriction policy imposed under the International Rubber Regulation Agreement, to which the United Kingdom, the Netherlands, France, and Thailand were signatories. Of the total area under *Hevea* cultivation a little more than one-half was operated by large European estates, the rest by the native small holders of British Malaya, the Dutch East Indies, Borneo, and Ceylon. The estate is a highly capitalistic agrarian enterprise with high fixed costs on account of heavy capitalization, maintenance work, and a system of elaborate European directorships. The native grower of a small *Hevea* garden, on the other hand, has no fixed costs. All he invests is his labor, and, if he has a bigger garden, part of the rubber harvested is paid out in wages.

Output and export control was enforced on both estates and native holdings. During the period from 1935 to 1940, Malaysian rubber shipments were fixed at an average of 68.5% of officially assessed capacity. Controlling more than 98% of the world's rubber supply, the regulation scheme was able to raise prices, at times very considerably, by tightening supplies and passing the costs of restriction on to the ultimate consumer of rubber.

Output restrictions raised the average cost level of the estate industry because of the incidence of high, invariable cost on reduced volumes of production. By applying restriction with mechanical equality to high- and low-cost producers alike, it also increased the average costs of the industry over what they would have been in the absence of control. This arbitrary disregard of differences in productive efficiency also served to prevent average cost reductions, by suspending competition not only between estate producers, but also between different producing countries and, above all, between estate and native growers.

A comparison of rubber prices and the dividend record of rubber companies during the last decade, therefore, gives no reliable indication of what rubber price would have been reasonably profitable to the majority of smallholders and to low-cost estate producers. However the estimate may be ventured that, under conditions of production near full capacity, a price of 8¢, and perhaps less, would have insured sufficient native production and a fair profit to efficient estate companies. As regards the future, it must be realized that the reorganization of the estate-rubber industry after the war will give it a chance to start with a clean slate.

In Great Britain a provision for government compensation of war damage sustained by business enterprises in the British territories now under Japanese occupation is under consideration. A postwar Malayan Rubber Reconstruction Board has been proposed which will act as agent for the government in assisting the rubber companies to start operations again when the war ceases. In view of the ascendancy of the synthetic industry, there is no reason why such an agency should salvage the whole plantation industry and bring it as nearly as possible to its prewar structure. It is conceivable that the occasion may be seized to retire the relatively inefficient estates, at least as far as such relative inefficiency is the consequence of an unsuitable physical environment and the advanced age and low productivity of the trees. At the same time smaller estates could be amalgamated and huge estates broken up to eliminate numerous uneconomic units, and a thorough reorganization of the expensive directorate and agency system could be encouraged. Such readaptation of the Far Eastern estate industry to peacetime conditions, in addition to a greater output share allowed to natives, would tend to diminish average output costs markedly and make operations profitable at a rubber price of less than 8¢ a pound even if wage rates were increased.

The assumption that further scientific progress with cost-decreasing effects is open only to the synthetic industry is also fallacious. By large-scale utilization of disease resistant and highly productive bud-grafted stock and by the selection of optimum tapping schedules, both yields per acre and per tapping operation are capable of marked improvement. If at the same time native growers are given thorough technical assistance, it is by no means impossible that *Hevea* rubber may be produced profitably at about 4¢ a pound in the not-too-remote future.

This is very different from the 22¢ a pound of rubber in 1941. Even a natural rubber price of, say, 8 or 10¢ a pound indicates a notable price differential if we assume a Buna S price of 22¢. The price differential has to be reappraised, of course, in the light of the comparative properties of the two materials. They differ greatly in chemical composition and, hence, in chemical and physical qualities. Like other artificial rubber although to a lesser extent, Buna S is superior to the plantation product in resistance to gasoline, oil, and chemicals. It is less affected by air and light and has greater resistance to abrasion. Finally, Buna S is a more uniform material than natural rubber—an advantage in processing on a mass basis. Wherever these properties are of importance, Buna S will doubtless fetch a premium price in direct proportion to its specific qualitative superiority, no more and no less. Whenever these qualities are of lesser or no importance, or whenever a low-price product is to be manufactured, natural rubber will tend to command

the field on a price basis. Considerable as the differences in properties are, it would be unwise to expect that price will not remain an important factor.

Tires represent, of course, the most important field of application. Satisfactory tires can be made from Buna S today. Truck tires can be produced that are as good as natural rubber tires were only five years ago. Passenger-car tires, if used at moderate speeds, are reported to give a mileage 30% greater than those made from natural rubber. At speeds in excess of 50 miles an hour, however, they tend to deteriorate rapidly because of an inordinate generation of internal heat. But further technological progress will undoubtedly be made in the properties of Buna S, in compounding, and in tire engineering. Enthusiasts predict a Buna S tire that will have a life expectancy of 100,000 miles and more and will thus outlive the motor car. This possibility may be granted as a long-run development. At any rate it is likely that despite a considerable price differential Buna S will be used extensively for tire treads in the immediate postwar period. In addition to all-natural-rubber tires and all-synthetic tires, we may get a tire with a Buna S tread, natural rubber carcass and sidewalls, and a reclaim bead. Eventually synthetic rubber may be used regularly in sidewalls. Much will depend upon the relative price and quality differential between natural and synthetic rubbers. The stimulus of keen competition may lead to improved processing of natural rubber, and means may be devised of so modifying plantation rubber as to give it more homogeneity and some of the properties in which it is now excelled by artificial rubbers.

The prospective price differential between natural and synthetic rubbers must be reviewed also in the light of possible "cut-throat" competition. We have seen that the world's total rubber production capacity is likely to be grossly in excess of the world's capacity to consume, once the first postwar spurt of abnormal demand has subsided. If a violent and persistent competitive struggle between natural and artificial rubbers should develop, prices can be expected to drop to an unusually low level. The plantation product may be marketed for 4 or 5¢ a pound. The experience of the early thirties revealed that in an emergency the Malayian rubber industry is capable of enduring such a depressed price for a long time.

Of course there is a limit to protracted price slashing for both industries. The cost structure of the American synthetic plant is totally different from that of the native *Hevea* garden and considerably different from that of the capitalistic estate enterprise. The initial capital investment required for synthetic factories and rubber estates is about equal per ton of output capacity, but the optimum rate of depreciation favors the estate. Cautious synthetic manufacturers and estate producers suggest depreciation allowances on five-year and 13-year bases respectively.[3] The physical life expectancy of machinery and instruments used in synthetic plants has been computed to be an average 12 years, and the life of a rubber tree 30 years. The native producer has hardly any capital costs at all. In addition synthetic rubber production requires raw materials, such as petroleum products or alcohol, soap, and various chemicals, while such costs are only a trifle in the case of natural rubber production. Power costs are very heavy in synthetic rubber production. In the case of natural rubber, latex production is a continuous process which uses the energy provided by sunlight. On the other hand a large portion of estate production costs is absorbed by wage payments; while labor costs are sure to be relatively small in synthetic production. It is impossible, at present, to suggest limits within which these various cost items will move, but it seems quite likely that the over-all downward limit favors the production of plantation rubber.

[3] On this basis the capital cost of synthetic rubber has been estimated at about 6¢ a pound.

Problem of Protection of the Synthetic Industry

After this tentative preview of the postwar rubber situation it is possible to approach the question of protection with some degree of realism. We do not need to analyze the forces that will exert their political influence toward the retention of a big subsidized industry. Aside from the unprincipled opportunism of professional protectionists, it is obvious that powerful vested interests are being developed. Protectionist appeals are quite likely to meet with considerable approval on the part of some sections of the public, since the costs involved and the alternatives open are usually belittled or not mentioned at all by the proponents of protection. The car owners of this country have undergone a protracted tire famine. They will want everything done to prevent a repetition of this unpleasant experience, and the exhortation of "Never Let This Happen Again" will be a popular slogan. The public desire to be spared a similar rubber shortage in the future is, of course, absolutely justified. The question is whether subsidization is necessary to attain this objective.

Thus far, five rational arguments have been advanced in support of a protected synthetic rubber industry: (1) The military self-sufficiency argument: rubber is a critical, strategic material that occupies a key position both in civilian economy and in the manufacture of war implements. An insured supply in wartime therefore is deemed indispensable. (2) It would be foolish to "junk" the huge plant capacity built at public cost. (3) The supply of plantation rubber is subject to foreign monopolistic control, which lends itself to the exploitation of the American consumer. (4) A large supply of domestically produced artificial rubber, it is contended, promises stable rubber prices, a development that would be greatly to the interest of rubber goods manufacturers. (5) Full employment is the cardinal postwar aim of social planners, and the domestic production of rubber will furnish employment for American labor. (*To be continued*)

Institute Plant

(*Continued from page 460*)

ples daily. The plant has a main laboratory which consists of a two-story and basement brick building. On the ground floor are located most of the physical testing equipment, such as mills, presses, (see Figure 33), testing machines, etc.; and on the second floor are located the chemical laboratory (Figure 35) and offices. A field laboratory in the heart of the plant controls the preparation of solutions and the charging and dumping of the reactors and sends many samples to the main laboratory by means of a pneumatic conveyer, as shown in Figure 34. When a sample arrives at the main laboratory, it will be checked in and announced over a speaker system to insure prompt attention.

When fully staffed, the copolymer plant will employ a total of 100 chemists and analysts for control work, of which approximately 50% will be women. High school girls for analytical work are trained at the Mercer School in Charleston under the supervision of graduate chemists for about four months before starting work at the Institute plant.

EDITORIALS

Conservation and Conversion

IN SPITE of the very good outlook for the production of synthetic rubber in significant tonnages during the last half of 1943 and more particularly during 1944, conservation of the rubber in the tires of our 25,000,000 or more automobiles has never been more important than it will be during the next six months. The "critical period" for rubber as prophesied in the original Baruch Report for the third quarter of 1943 and the quarters immediately succeeding is upon us.

In a letter to all gasoline and tire dealers, the Rubber Director on July 26 said that despite all statements to the contrary, the nation's stockpile of new and usable tires is dwindling rapidly, and the lowest point in history is going to develop between now and the end of September. Relief for any other than the most essential civilian driver is not immediately available since America's newly developed supply of synthetic rubber must be diverted first to hundreds of military needs, and America's rubber factories must concentrate their facilities on the manufacture of the most vital war products first, he added.

The Petroleum Industry War Council is therefore sponsoring a nationwide campaign for recapping tires when necessary, and the rubber industry should certainly be considered as delinquent if it did not join in this campaign by means of its advertising programs, its tire dealers and distributors, and by missionary work on the part of its personnel whose action in emphasizing the statements of the Rubber Director in this connection should carry added weight with the public. Recent utterances by Litchfield of Goodyear, Davis of U. S. Rubber, and Seiberling, of Seiberling Rubber, concerning the amount of tire production for civilians during the immediate future have been in the right direction, but represent only a small portion of the work that will have to be done to bring home to the American motorist that prosperity as represented by freely available tires is around a corner that is at least six months in length.

The magnitude of the problem that faces the manufacturer of rubber products including tires in the conversion from the use of natural to synthetic rubber should be more forcibly impressed on the public. Now that many of the government plants for the production of synthetic rubber are or soon will be in actual operation, the tendency is for the motorist to take the attitude that it is no longer necessary to be so careful with his present tires as he will soon be able to get new ones. The present rubber situation was stated quite clearly by R. P. Dinsmore, vice president of the Goodyear Tire & Rubber Co., at the dedication of the new Goodyear Research Laboratory in June when he said:

". . . . the problem of completing the construction program, which seems nearing its final stages, is far from the only one. In the first place, these plants must produce their rated capacity of rubber week in and week out, in order to maintain the rubber position. This must be done with newly designed equipment, which will constantly develop unsuspected weaknesses. Then, too, the rubber must be sufficiently uniform from all plants to avoid hardships in the plants where it is consumed. In the next place, the rubber goods manufacturer must adapt a new type of rubber to his present processing equipment with a minimum of alterations and additions and this in a volume larger than the country has ever before used. Finally, he must continuously convert his finished products to increasing percentages of synthetic rubber, while not only maintaining his output, but also a reasonable degree of quality and performance."

In order really to convert the American motorist to the necessity of care and conservation of his tires during the next six-month critical period the statements of the Rubber Director and rubber industry heads should be in evidence at every gasoline station and tire distribution and repair shop in the country. The problem is here; the answers are known, and nothing short of an all-out conservation program will produce the necessary results.

Increased Manufacturing Costs

IRRESPECTIVE of the relative merits of the pro's and con's of the decision, the WLB has insisted that the wage raise of 3¢ an hour granted to 76,000 employes of the "Big Four" rubber companies in Akron and Detroit on May 21 must stand in order to maintain stabilization of wage rates under the National Economic Stabilization policy.

The granting of this wage increase, which has as its purpose the compensation of the workers for the increased cost of living according to the Little Steel formula, brings up what some day might be a pretty important point affecting the cost of the manufacture of rubber products. Although the cost of synthetic rubber being produced in government plants to the manufacturer of rubber products is pegged at an equivalent figure with that for natural rubber, for the time being at any rate, this is only part of the new and higher cost of using synthetic rubber. The time required for processing GR-S will undoubtedly be longer and the percentage of defects that will be obtained using this rubber will also be larger, with the resultant increase in the cost of manufacture. The employer, therefore, is faced with an extra expense brought about by worldwide events beyond his control; while the employe, who is also a part of a country which has had to adjust itself to the use of a new raw material does not share in the burden. Instead of striving for an increase in the price of his products to compensate for this increased manufacturing cost, why should not the manufacturer ask the WLB for relief in the form of reduced labor costs? Control of inflation from the top down has had only mediocre success. Maybe it should be controlled from the bottom up?

What the Rubber Chemists Are Doing

Postwar Prospects Discussed at Goodyear Laboratory Dedication

THE papers given at the symposiums on synthetic rubber, plastics, and the future of chemistry and of transportation, held in connection with the dedication of the new research laboratory of the Goodyear Tire & Rubber Co., at Akron, O., late in June were of unusual interest in presenting a picture of past, present, and possible new developments in these important fields.

Synthetic Rubber

A very good review of the processes for the commercial production of butadiene and a discussion of physical and chemical properties of this chemical were given by Per K. Frolich and C. E. Morrell, of Esso Laboratories of Standard Oil Development Co. Pointing out that until a very few years ago butadiene was in the class of laboratory curiosities, Dr. Frolich emphasized the magnitude of the problem with which chemists and engineers have been and still are confronted with in meeting the requirements of the synthetic rubber program. He reviewed the three major classes of processes for the commercial production of butadiene: (1) reactions dependent upon building up the butadiene structure from materials containing only two carbon atoms (ethyl alcohol, acetylene, and ethylene); (2) reactions based on the conversion of suitable C_4 compounds into the diolefin structure (dehydration of butylene glycols); and (3) reactions involving the decomposition of molecules containing more than four carbon atoms (thermal cracking of higher boiling petroleum fractions). The aldol process, presumed the basis for the German manufacture of butadiene, the alcohol process as originally reported by Ostromyslenski and later by Lebedev, and the modification used by Carbide & Carbon Chemicals Corp., were first covered. The 2, 3 butylene glycol process of the Department of Agriculture and the chlorination-dehydrochlorination of butenes to produce butadiene were next discussed. The petroleum processes for the production of butadiene: high temperature thermal cracking, the successive dehydrogenation of butane and butene, and the catalytic conversion of butenes as worked out by Standard Oil, will account for more than half the butadiene required for the synthetic rubber program. Concentration and purification of butadiene by azeotropic distillation or by the formation of intermediate chemical compounds were also treated briefly. In talking on the chemical and physical properties, Dr. Frolich stressed the importance of care in handling butadiene because of the formation of explosive peroxides under certain conditions.

After paying tribute to a number of chemists who have played prominent roles in research at Goodyear during the last 35 years, Norman A. Shepard, chemical director, American Cyanamid Co., and technical consultant to the Rubber Director's Office, discussed some problems involved in the utilization of synthetic rubbers. He said that objective No. 1 of the Rubber Director, to get synthetic rubbers in quantity to meet the many demands made formerly on natural rubber, was being "licked." Objective No. 2 is now the big problem: to improve the quality of synthetic rubbers and get the best quality products from them. The abrasion resistance of GR-S was satisfactory, but cracking, heat build-up, low tear resistance, etc., were not so good as for natural rubber when used in tires at present. Mention was made of the necessity of using rayon tire cord in large tires because of the high temperatures developed in the GR-S stocks. Inner tubes that give good service are now being manufactured, although these tubes chafe more than natural rubber and tear more easily. The milling cycle for GR-S will, in most cases be longer, the tubing speed reduced, and the building time increased, since GR-S stocks lack "building tack," and calendered fabric and sheet must be swabbed with solvents or adhesive cements, it was said. Butyl rubber, or GR-I, is quite different from GR-S, and its freedom from crack growth, its excessive building tack, and low permeability to gases means that it may be used where GR-S fails to measure up to the service requirements. The merits of the oil-resistant types such as GR-M, Buna N, and "Thiokols" have long been recognized, and this use after the war should continue. Converted plants for the production of GR-P, the cheap polysulphide rubber originally intended for retreading of passenger tires, but now no longer required, constitute good insurance it was said. Dr. Shepard then reviewed the research program being carried out by the Rubber Director's Office and stated in this connection that the exchange of information necessary for the efficient conduct of this program he believed had reached a level never equaled previously in the rubber industry and had probably never been exceeded in any industry. He said that his concern was not over the comprehensiveness of the research program, but with what will happen to the incompleted researches when the war is over. It was his hope that the work could be continued in a Rubber Institute supported by the larger rubber companies and those smaller companies with the vision to join the effort. In this the industry has an opportunity right now which it is not likely to have again in the near future, in taking over a research program carefully organized and well executed, that can be perpetuated for the benefit of the industry as a whole.

Activities in synthetic rubber research in the Goodyear laboratories since the early 1920's and a recital of some of his experiences during a visit to Germany in 1937 in this connection were given by L. B. Sebrell, manager of research and new products at Goodyear. The remainder of his paper then consisted of the material presented in the Charles Goodyear Lecture, given before the American Chemical Society at Detroit, Mich., in April.[1]

Starting with the months following England's entry into the war, R. P. Dinsmore, Goodyear vice president, traced the slow development of any governmental program concerning rubber up to December 7, 1941. After that time the rubber program was fighting against time, and the many problems of butadiene and styrene plant design, standardization of the polymerization process, and the processing and converting problems in the rubber industry presented many and what appeared to be almost insurmountable difficulties. It was almost impossible to estimate future requirements for rubber, and despite the fact that a reasonably good stockpile of crude rubber had been provided, many conflicting statements concerning the rubber situation resulted in extreme confusion in the public mind. The Baruch Rubber Survey Committee was appointed and within an almost unbelievably short time reported to the President and gave the American public an authoritative and reasonably comprehensive view of the rubber problem. W. M. Jeffers was appointed Rubber Director and began an aggressive organization of the job. The butadiene and styrene programs were given preferred attention since they were farthest out of balance, and the competition between various processes for butadiene production are now history. The drive to limit and control the consumption of rubber was organized under industry experts, and the job of assembling and disseminating all available information on processing synthetic rubber was undertaken. Natural rubber production in the Western Hemisphere was investigated, and scores of special synthetic rubbers were checked and classified. Dr. Dinsmore then reviewed the factors influencing the present relation between the amounts of Buna S, Butyl, and neoprene rubbers in the present program and followed this review with a statement of the chief faults of the major government synthetic rubber, Buna S(GR-S), and what was being done to correct or get around these faults. In conclusion the speaker said that in spite of his emphasis on the difficulties still before us, he had no thought but that they will be overcome. Process and product troubles will occur, in fact have occurred already, but in a revolutionary change of this kind are only to be expected. The main thing is to appraise the overall results, which he said he felt sure would be good and would improve, as time went on, until a

[1] INDIA RUBBER WORLD, July, 1943, pp. 351-55; Aug., pp. xxx-xx, xxx; Sept., 1943.

brilliant future for this new undertaking was assured.

Plastics

The two great divisions of plastics—the thermosetting type and the thermoplastics, was the subject of T. S. Carswell, director of research, plastics division, Monsanto Chemical Co. Each type has its own particular advantages, he stated and pointed out that research has developed methods whereby the two types can be combined and blended to produce desired results. Dr. Carswell emphasized that the experience gained today in the field of plastics will be invaluable in the future production of plastics in peacetime. He said that it can be anticipated in peacetime that the thermosetting materials will primarily hold the field in structural applications; while the thermoplastics will find wide use in decorative and specialty uses.

Of the many thermosetting resinous materials produced by the reaction of formaldehyde with other chemical substances, it is possible that urea formaldehyde presents the simplest case permitting of thermosetting properties, it was stated by A. M. Howald, of the Plaskon division, Libbey-Owens-Ford Glass Co. He therefore presented a study of the formation of this resin in order to provide an understanding of all thermosetting condensation products derived from formaldehyde. The chemistry of the formation of monomethylol and dimethylol ureas, the condensation of these hydroxylated raw materials to form larger and larger, but still soluble and fusible products, and insolubilization and rendering infusible of the condensation product were explained. Factors affecting industrial applications of urea formaldehyde resins were discussed, and their use in molding compounds and as adhesives, of which formed plywood is a good illustration, were also discussed. Baking enamels based on the older alkyd-type resins have been vastly improved by the incorporation of urea formaldehyde, it was said.

Acrylic acid and its modern derivatives were the subject of the talk by D. S. Frederick, of Rohm & Haas Co., who also reported that 1943 was the 100th anniversary of the discovery of acrylic acid by the German chemist Redtenbacher. The original industrial development and application of the acrylic derivatives was due mainly to the perseverance and foresight of the late Otto Rohm, who published his doctor's thesis on "The Polymerization Products of Acrylic Acid" in 1901, the speaker declared. The first commercial acrylic products were originally used in the preparation of laminated glass, and cast sheets of Plexiglas, Rohm & Haas' acrylic plastic, are extensively used for forming transparent bomber noses, gun turrets, cockpits, and other plane enclosures which have increased the visibility of our plane crews and given our planes a superior offensive and defensive strength. The acrylic resins have been found to be excellent vehicles for luminescent pigments used in luminescent paints. Solutions are used as adhesives for wood, metal, rubber, glass plastics, and other types of materials, and emulsions are used in leather and textile finishes. While wartime applications of the acrylic derivatives are consuming large quantities of these products, Dr. Frederick believes that many industries now using them will expand their peacetime applications.

The Future of Chemistry

Speaking mostly about plastics and magnesium, Leland I. Doan, vice president, Dow Chemical Co., described the manufacture of bromine, sodium chloride, calcium chloride, and magnesium chloride from the brine wells at Midland, Mich., and the production of magnesium metal. Discussing plastics, he said Dow had limited its activity to those derived from wood, oil, and brine—their basic raw materials. As an example, he cited the production of ethyl cellulose. The story of the extraction of bromine from sea water was emphasized as having been the means of obtaining the background for the vastly larger operation of quickly producing great quantities of magnesium metal from the sea.

Pointing to the fact that present living conditions resulting from the efforts of such men as Edison, Westinghouse, Ford, Bell, Eastman, Bakeland, and Dow during the past 50 years have to some extent awakened people to the realization of the value of scientific comforts and luxuries, E. R. Weidlein, director of the Mellon Institute of Industrial Research, stated it had also brought to the attention of the American people the dependency of their very existence upon the research scientist and and engineer.

It was stressed that by virtue of the fundamental research conducted for a period of years, we had been able to make the almost unbelievable progress in the fields of electronics, explosives, petroleum processing, textiles, and synthetic rubber since Pearl Harbor. In commenting on the synthetic rubber program, Dr. Weidlein stated that even with the pooling of all the scientific information on this subject, it required the financial support of the government to establish the industry on such a large scale in so short a time. The changes are so rapid and will continue to be so rapid in the future that the entire industry will be obsolete within a period of five years, and that is the basis upon which the government has planned to liquidate its investment, he said. Synthetic rubbers are entirely new raw materials, and their future development will not be confined to the automotive industry, but will find thousandfold applications in industries of every type. In conclusion, the speaker stated that the potentialities for continued industrial expansion in the future are greater than at any time in the past and that one of the most important tasks is the stimulation of scientific research.

Nylon, now wholly at war, is expected to find a wide variety of new uses with the coming of peace, G. P. Hoff, director of nylon research for E. I. du Pont de Nemours & Co., Inc., declared in his talk on the development and uses of nylon. Ten different types of nylon, each with distinctive properties, are now being made, and the theoretical number of possible nylons runs into the thousands. The value of nylon for parachutes, glider tow ropes, and bomber tire fabrics was now being demonstrated in many places on our far-flung battle fronts. The importance of nylon's resistance to moisture and mildew has also had applications in the tropics. Peacetime applications will probably range from evening dresses and men's shirts to featherweight tents, scuff-proof shoes, durable, easily cleaned automobile upholstery, rustless and stainless window screens, and sash cords that should last as long as the house. No picture of the postwar world can be clearly drawn without taking note of the part which government will play, he said, and in this all of us are hopeful that cooperation between government and industry will be the key word, that management will be permitted enough room for originality, and that taxes will not be so burdensome as to prevent the accumulation of "venture capital" for new projects and products.

Citing the record of university research in the creation of the beginnings of many of the materials, weapons, and tools of war, Harry N. Holmes, of Oberlin College and past president of the American Chemical Society, warned that there must be no curtailment in university research work since it is upon such work that the postwar industry will build. For the duration much secret war research proceeds in a number of university laboratories, financed by the government, and because of the new and frequent contacts between the Armed Forces and the professors and their assistants, academic remoteness will never be the same again, he said.

The speaker discussed research work being done by the rubber industry in the synthetic rubber and fiber fields and stressed the need of continuing this research because of the great opportunities that exist in this field.

The Future of Transportation

Research is unlocking the great storehouse of chemical compounds that we know as petroleum, and the engine builders are the guides in that research, said A. B. Culbertson, of Shell Oil Co. in his talk. The research which has produced the methods and processes for manufacturing the special high-octane materials has also opened new fields with regard to lubricants, solvents, and special organic chemicals. Regardless of what we may do in the petroleum industry, the value of our product as a fuel is dependent to a large extent on the type of equipment in which it is burned. Speaking on Diesel engines, Dr. Culbertson observed that this type will not compete in the postwar period as a means of propelling airplanes, and although it may be used in certain heavy-duty trucking operations, its main field will be the railroads and in stationary power units.

In aviation, isolation is technologically impossible, said J. C. Hunsaker, chairman of the National Advisory Committee for Aeronautics, in his opening remarks, who then went on to describe the probable situation in the postwar world for aviation. Worldwide air transport operating in accordance with an international air

convention under the flags of many nations and a very active domestic demand were predicted. In aviation the social aspect of expected technological progress from research has largely displaced economic considerations, and aviation from the beginning became the concern and ward of governments who feared the obvious applications of the airplane in war, he said. They could not wait for industry to become strong enough to conduct research at its own expense, and the speaker then outlined the workings of the NACA during the last 28 years in supplying material for designers in the form of research results. It was pointed out that there is a great benefit to industry from government conducted scientific research freely available to all, but there is also a real risk inherent in dependence on a government laboratory. Items from which the probability of sensible improvements in airplane performance might be expected, such as size of planes and engines, propellers, structural weight, aerodynamics, fuel economy, general design, and safety were discussed.

In his talk on "The Development of the Tire", P. W. Litchfield, Goodyear chairman, traced the history of this development from the patent for the first pneumatic tire granted in England in 1845 to R. W. Thompson through the work on the fabric and cord types and emphasized the influence of advances in the art of compounding and processing rubber as well as the necessary advances in the mechanics of tire construction. The equal importance of the experimental work necessary for the determination of the proper kind of tire fabric and cord and its required physical properties was also described. Of particular significance at this time was the statement that the production of the rayon truck tire in 1936 gave the first satisfactory solution to the heat problem in high-speed truck tire service.

Major General C. M. Barnes, chief, technical division, Office of the Chief of Ordnance, War Department, Washington, D. C., was the principal speaker at the dedication dinner June 23 at the Hotel Mayflower. General Barnes first explained the methods by which the research and development activities of the Ordnance Department were carried out in peace and war and paid tribute to the Goodyear Company and the rubber industry committees in the solution of problems concerned with the use of rubber and now particularly synthetic rubber for use in weapons of war. He then described in an extremely interesting manner a recent trip of some 30,000 miles to the North African front.

California Group Meets

HERMAN JORDAN, president of the Group and Pacific Coast representative for E. I. du Pont de Nemours & Co., Inc., was the speaker of the June 24 gathering of the Northern California Rubber Group at the Hotel Claremont, Berkeley, Calif., which attracted about 40 members and guests. Recently returned from a trip to the East, Mr. Jordan presented some of its highlights and revealed new developments in the conversion program of the East. He also emphasized that West Coast manufacturers have not yet made themselves heard to any great extent, but that the Rubber Director's office is anxious to learn what the Pacific Coast can do with the various synthetics. The speaker urged his audience to submit to the Rubber Director's office samples of various items the West can make from synthetic rubber. Thus western manufacturers would be given full consideration when it came to the allocation of synthetics. Mr. Jordan then summarized the various types of neoprene du Pont is producing and explained why so many types are necessary and their various applications under present conditions.

After a brief business meeting, which included a discussion of the summer outing scheduled for August 8, the motion picture "Facts about Fabrics" was shown. Next came the drawing for two door prizes, donated by Columbia Steel Co. and won by Geo. Graham, of Reliance Rubber Co., and Mr. Sague, of Plant Rubber & Asbestos Works. Other prizes, consisting of du Pont paint contributed by Mr. Jordan, went to Messrs. Petelin, Swain, Lycett, Page, and Green. The table favors at dinner, rubber suction cups, were furnished by du Pont.

Rubber Division Fall Meeting

AS ANNOUNCED last month, the Division of Rubber Chemistry, A. C. S., will hold its annual fall meeting in New York on October 5, 6, and 7 instead of convening with the American Chemical Society for its one hundred and sixth meeting in Pittsburgh in September. This decision was reached by the executive committee of the Rubber Division when it became apparent that none of the available Pittsburgh hotels could adequately serve the Division as headquarters.

The arrangements for the New York meeting are being handled by a committee headed by E. B. Curtis. The Commodore Hotel has been selected as headquarters, and the committee urges that hotel reservations be made *now*. Those reservations which the Commodore cannot take care of will be referred to the nearby Biltmore, Lexington, Roosevelt, and Waldorf Astoria hotels. The committee also urges that transportation arrangements to and from New York be made well in advance of the meeting.

The technical sessions will be held at the Commodore, and members of the Division are invited to participate in the varied program of this meeting by presenting a paper on any phase of rubber science and technology. Censorship is being relaxed somewhat from certain phases of the synthetic rubber development, particularly with respect to compounding and processing, and in reporting work in this field at the October meeting members will have an opportunity to assist in the solution of the many problems involved in the adaptation of the synthetic rubbers. A 200-250-word abstract in triplicate must be received by the Office of the Secretary, H. I. Cramer, Sharples Chemicals, Inc., 23rd and Westmoreland Sts., Philadelphia, Pa., by August 25. Since all papers dealing with synthetic rubber must be approved by Washington, all manuscripts on this subject should be received by the Secretary by September 15. The rule of the A. C. S. that at least one author of any paper must be a member of the Society applies to papers for the meeting.

The Division banquet is scheduled for the Commodore on Wednesday evening, October 6, and because of the critical food situation the Committee would appreciate it if, when making reservations, members and guests indicate whether or not they plan to attend this function. The program will be announced later.

The results of the letter ballot for the annual election of officers for 1943-44 will be announced during this meeting of the Rubber Division.

The officers and committee are making every effort to organize a meeting that will serve members of the Division and the rubber industry. The program has been deliberately scheduled over three days in order to allow ample time for full discussion of the papers, for the usual "corridor" sessions, and for visiting. There will be an opportunity to relax and at the same time gain a new approach to important technical problems.

The treasurer of the Division, C. W. Christensen, is desirous of obtaining January, 1941, and April, 1941, issues of *Rubber Chemistry and Technology* and will pay $2.50 for each copy of these numbers received in good condition at his office, 1012 Second National Building, Akron, O.

New Reanite Bonding Process

A NEW method of bonding natural or synthetic rubber to metal, or plastics to metal not only does away with costly brass plating processes, but develops a bond from three to five times as strong. The new method, known as the Reanite Bonding Process, develops a bond between rubber and metal ranging from 900 psi to as high as 2000 psi on a pull test. The bond develops its maximum strength at room temperature, but its strength over a range of —40° F. to as high as 300° F. is substantially stronger than bonds obtained by conventional process, according to the manufacturer. The process may also be used to bond metal to metal, or leather or wood to metal or to each other, and the joint is unaffected by fresh or salt water, is non-corrosive to metals, possesses excellent corrosion resistance in itself, and has high dielectric strength. Present applications include fabrication of airplane sub-assemblies, motor mounts, sound and vibration dampeners, instruments, composite metallic and plastic units, tank lining assemblies, etc. U. S. Stoneware Co., Akron, O.

Report of A.S.T.M. Annual Meeting

THE forty-sixth annual meeting of the American Society for Testing Materials held in Pittsburgh, Pa., June 28 through July 1 had many important actions on standards and discussions on numerous research investigations. The registered attendance was 1,452 members, committee members, and guests, and there were 245 technical committee meetings and 15 technical sessions in the fields of both metals and non-metals. Technical papers were presented in the sessions on soils, water, hardness testing, petroleum and asphalt, corrosion, non-ferrous metals, rubber and plastics, and cementitious materials and concrete.

The Eighteenth Edgar Marburg Lecture on "Wood as an Engineering Material" was given by L. F. Markwardt, chief, Division of Timber Mechanics, United States Forest Products Laboratory, Madison, Wis., who talked primarily on the wartime use of wood and covered significant research accomplishments both with respect to utilization of the material in its natural form and in modified forms through the use of glues, synthetic resins, etc. At the general session the retiring president, H. J. Ball, of Lowell Textile Institute, discussed the relation of the A.S.T.M. to the textile industry; and the new president for 1943, Dean Harvey, materials engineer, Westinghouse Electric & Mfg. Co., was introduced.

Four new standards were accepted by Committee D-11 at the annual meeting. These specifications and test, which will be published for a year or more as tentative, are: Low Temperature Brittleness of Rubber and Rubber-Like Materials; Compressed Asbestos Sheet Packing; Insulated Wire and Cable: Polyvinyl Insulating Compound; and Rubber and Synthetic Compounds for Automotive and Aeronautical Applications.

The first test, a development of the Thiokol Corp.'s laboratory, is used in evaluating the resistance to freezing temperatures of rubber and synthetics used in automotive and aeronautical products.[1] The second test gives in a consolidated standard a number of test procedures such as thickness, tensile strength, bending, compressibility, aging, immersion and corrosion tests suitable for use in evaluating compressed asbestos sheet packing. Large quantities of this material are now being used in aircraft engines, and the need of standardized test methods had become most urgent. The specifications for insulated wire and cable, polyvinyl insulating compound, were necessary to provide standardized requirements for this rubber substitute. The situation with respect to the supply of natural rubber has made essential the fullest use of all available substitutes, and with increased amounts of vinyl plastics becoming available through new plant construction this material is being allocated more broadly for uses where it can replace natural rubber. The new specifications for rubber and synthetic compounds for aeronautical and automotive applications have been based on simplification projects carried out in Technical Committee A on Automotive Rubber sponsored jointly by the A.S.T.M. and the SAE.[2] Compounds of natural rubber, reclaimed rubber, synthetic rubber, or rubber-like materials, alone or in combination, which are intended for use in manufacturing various products, but not including compounds for tires, inner tubes, sponge rubber, and hard rubber, are covered.

One other tentative standard on testing sponge rubber was revised, and seven tentative standards ready for adoption as standard were not recommended for adoption as standard as a war economy, since such action was not considered essential and would involve reprinting and considerable other expense. For these and other reasons all tentative standards under the jurisdiction of the committee were recommended for continuation as tentative for the time being.

In the 1942 annual report of Committee D-11 mention was made of the agreement reached between Committee D-20 on Plastics and Committee D-11 as to jurisdiction over rubber-like materials which might be classed either as artificial rubbers or as plastics. It has now been necessary to reopen the matter particularly with respect to polyvinyl chloride (Koroseal) and polyisobutylene. Committee D-11 has therefore waived jurisdiction in favor of Committee D-20 as far as these basic materials are concerned, but reserves jurisdiction over products containing them when they are used in these products as substitutes for rubber. This question, together with the very general substitution of synthetic materials for natural rubber, has reopened the matter of revision of the scope of Committee D-11, and this matter is now in the hands of a special committee for further study.

The papers presented at the meeting were of special interest. One described the use of the durometer for measuring hardness of rubber and was given by R. H. Taylor, of the National Bureau of Standards. The results of extensive work were reported, and a recommended procedure was outlined. It was stated that if durometer readings were plotted against the logarithm of time, straight-line curves were obtained, the slopes of which might be taken as a measure of creep.

The other paper, by I. L. Hopkins, of the Bell Telephone Laboratories, covered the relaxation (flow) of synthetic rubbers in which a method was presented whereby each specimen may be permanently fixed in its own test cell that can be subjected to any desired conditions. Since the cells are inexpensive, it is practicable to test a large number of specimens over a long period.

Reports by the various sub-committees on automotive rubber, insulated wire and cable, packings, life tests, sponge rubber, rubber coated fabrics, and low-temperature tests dealt to a considerable extent with the work being done to provide new specifications and tests for the larger percentage of both new and old rubber products that will be made from synthetic rubbers and rubber-like materials in the near future.

[1] INDIA RUBBER WORLD, Jan., 1943, p. 392.
[2] IBID., Aug., 1942, pp. 467-69; Apr., 1943, p. 61.

Forum on Synthetic Rubber

THE summer meeting of the Rhode Island Rubber Club, held at the Metacomet Golf Club, July 18, was featured by a forum of synthetic rubber conducted by E. L. Hanna, of the Davol Rubber Co. The afternoon was devoted to golf, followed by dinner and the awarding of prizes made possible by the generosity of the contributors given below.

An interesting talk by Joseph Breckley, of Titanium Pigment Corp., on the greatly improved flex-cracking resistance of GR-S stocks containing hard clay was given at the discussion on synthetic rubber after dinner. He was followed by A. J. Puschin, of Thiokol Corp., who presented some information on a good plasticizer for synthetic rubber that this company recently announced, and Bruce Silver, of New Jersey Zinc Co., discussed the effects of zinc oxide in acetone-extracted GR-S rubber. Edward Osberg, of Wilmington Chemical Co., reported results on the use of Naftolen in natural and synthetic rubber stocks.

Excellent entertainment in the form of a demonstration in the art of sleight-of-hand was also provided by C. Foster Fenner after the business meeting.

Companies who contributed toward the prizes for the meeting were as follows:

Binney & Smith Co., H. Muehlstein & Co., Inc., Pequanoc Rubber Co., Carbo Chemical Co., Solar Compounds, Taylor Instrument Cos., L. G. Whittemore Co., R. T. Vanderbilt Co., Inc., Wishnick-Tumpeer, Inc., A. Schulman, Inc., Anaconda Sales Co., Moore & Munger, Wm. D. Egleston Co., Weller Chemical Co., Xylos Rubber Co., Wilmington Chemical Corp., Naugatuck Chemical Division of United States Rubber Co., Monsanto Chemical Co., Continental Carbon Co., Imperial Paper & Color Corp., Titanium Pigment Corp., Thiokol Corp., Henry L. Scott Co., Standard Chemical Co., Cleveland Liner & Mfg. Co., Godfrey L. Cabot, Inc., American Cyanamid & Chemical Corp., New Jersey Zinc Sales Co. and E. I. du Pont de Nemours & Co., Inc.

A.S.M.E. Rubber & Plastics Group Meeting

AS PART of the semi-annual June meeting of the American Society of Mechanical Engineers, the Rubber & Plastics Group held a joint session with the Aviation Division at the Biltmore Hotel in Los Angeles, Calif., June 17. The program was in charge of John Delmonte, of the Rubber & Plastics Group, and John E. Young, of the Aviation Division. Four papers were presented at this joint session:

"Physical Properties of a Structural Plastic Material", by C. W. Armstrong, Lockheed Aircraft Corp.

"Thermoelastic Forming", W. I. Beach, North American Aviation, Inc.

"Protection of Aircraft Instruments and Delicate Apparatus against Vibration and Shock by the Use of Rubber", P. C. Roche, Lord Mfg. Co.

"Wood-Cloth and Wood-Paper Laminates", John Delmonte, Plastics Industries Technical Institute.

The chairman of the A. S. M. E. Rubber and Plastics Group, G. M. Kline, of the National Bureau of Standards, is now planning the presentation of papers for the next session of the Group, which will be held in connection with the annual meeting of the Society in December.

UNITED STATES

Rayon Cord Use Criticized; WLB Rubber Workers Wage Decisions

The end of June saw the opening of additional government synthetic rubber plants, and still other plants were expected to be in operation by August 1. Secretary of Commerce Jesse Jones in a telephone address to the "Made in America" luncheon held in connection with the opening of the GR-S plant at Baytown, Tex., to be operated by the General Tire & Rubber Co. and the General Latex Co., said that now 'that the storm of words has subsided and government, together with industry has been allowed time to do the necessary work, we have what we set out to get when forced into the war—a completely integrated rubber industry. Secretary Jones paid tribute to Rubber Director Wm. Jeffers and his staff in saying that Mr. Jeffers' insistence and determination that construction materials be made available, that all phases of the program be thoroughly checked, and that speed be the watchword have been responsible for the early completion of the plants.

A 60,000-ton GR-S unit for operation by the Goodyear Tire & Rubber Co. at Houston, Tex., should be in operation by August 1; while a 45,000-ton unit to be operated by The B. F. Goodrich Co. at Borger, Tex., a 60,000-ton unit at Port Neches, Tex., to be operated by the same company, and another 60,000-ton unit at Port Neches to be operated by the Firestone Tire & Rubber Co. were all scheduled to get into operation within the next two or three months.

The government styrene plant to be operated by the Dow Chemical Co. in Los Angeles, Calif., went in operation late in June and the butadiene plant to be operated by the Shell Oil Co. was expected to get into production during July while one 30,000-ton unit of the copolymer plant to be operated by the Goodyear Tire & Rubber Co. was now in operation.

National Lead and du Pont Indicted on "Cartel" Charge

A federal grand jury in New York on June 28 indicted the National Lead Co., E. I. du Pont de Nemours & Co., Inc., and four individuals on charges of participating in a worldwide conspiracy to control the production and marketing of titanium compounds. Besides the corporate defendants and F. W. Rockwell, president of National Lead, the indictment named Claude F. Garesche, general manager of the titanium division and a director of National Lead, Carl H. Rupprecht, general manager of the Krebs pigment division of du Pont, and Gustav Jebsen, vice president of the Titan Co. Virtually all of the largest chemical companies of the world were named as co-conspirators, including Germany's I. G. Farbenindustrie, Great Britain's Imperial Chemical Industries, Ltd., Italy's Montecatini, and Japan's Kokusan Kogyo Kabushiki Kaisha. The indictment charged that an effect of the alleged cartel was to split the world into assigned markets in which designated members of the group were to have non-competitive sales opportunities. Mr. Rockwell, in a statement issued following the return of the indictment, said that the practices complained of were generally viewed as legal and proper at the time they were inaugurated, and some of the contracts concerned dated back to 1920. He also said that this is not the time or the place to reply to these charges. We will be heard before an impartial court, he said. All the defendants entered a plea of not guilty at an arraignment on July 15, and no date for the trial could be learned from the District Court late in July.

WLB Insists on 3¢ per Hour Akron Raise; Higher Rates for Other Localities

After reconsidering its May 21 decision at the request of the United Rubber Workers Union, the WLB on June 30 announced that the 3¢-an-hour raise granted to the approximately 76,000 employes of the "Big Four" must stand. The union had requested that the Board change its original decision, claiming principally that the industry-wide application of the Little Steel formula was an unrealistic one because it grouped together different branches of the rubber industry, and it resulted in an inequitable reduction in the wage increase due to the Akron workers. The majority of the Board held the view that the industry approach to these cases is not only practical and equitable, but the only approach which will provide for the stabilization of wages required under the National Economic Stabilization policy. In calculating the maladjustment allowance, the Board followed a course which had already been found realistic and practical; the parties to the United States Rubber case had voluntarily agreed that the maladjustment allowance should be computed for eight plants combined as a unit even though these eight plants manufacture products typical of each branch of the rubber industry.

On July 13 the WLB directed the U. S. Rubber Reclaiming Co., Buffalo, N. Y., to grant an increase of 4¢ an hour to the starting rate for common laborers and to the rates for workers in the skilled and semi-skilled rubber processing operations. The Board also directed the company to reduce the period between the starting rate and the top rate for each job from two years to one year so that increases of 2¢ an hour would be granted at the end of each three-month period. The WLB granted the increases to bring the rates at the plant to the minimum of the bracket of going rates for similar rates in the Buffalo area. A demand by the union for a general wage increase of 4½¢ an hour for maintenance workers and for a night shift premium was denied.

Stating that it was acting in accordance with the principle of industry-wide wage stabilization, as enunciated in the "Big Four" decision, the WLB on July 24 ordered wage increases ranging from 3¢ to 10¢ an hour for workers at three plants of the Firestone company and two Indiana plants. Workers in Firestone's Memphis, Tenn., plant were granted a general wage increase of 8½¢ an hour for time and piece workers and an increase of 5¢ an hour in the hiring rate, retroactive to the first payroll period after October 31, 1942. Firestone workers in Fall River, Mass., were awarded a 5¢ general increase retroactive to August 28, 1942. A 10¢ general increase was awarded workers at the Huntington, Ind., plant of the Schacht Rubber Co. and a 7½¢ increase to workers of the Schacht company (Firestone controlled) at its Noblesville, Ind., plant. The Board granted the request of the United Rubber Workers, CIO, for maintenance of membership clauses in contracts at the Firestone plants at Los Angeles and Memphis and at the Schacht plant in Huntington, Ind., but denied the same request in the case of the workers at the Noblesville plant. The Board stated that the union in this case had not demonstrated a sufficient degree of responsibility and had participated in recent work stoppages, but the Board's order provided for petition after 60 days by the union for reconsideration of this latter decision.

Jeffers Says Synthetic Rubber Here to Stay

In an interview in Washington on July 13, Mr. Jeffers stated that synthetic rubber will hold its own after the war without the benefit of tariffs or subsidies. He said that the continuation of the manufacture of synthetic rubber on a large scale in the United States did not necessarily mean that this country might not also continue to buy and use a considerable amount of natural rubber. A lot of factors make any flat predictions hazardous, he further declared. The cost of synthetic rubber after the war will depend in large part upon the

CALENDAR

Aug. 8.	Northern California Rubber Group. Summer Outing.
Aug. 14.	Chicago Rubber Group. Summer Outing. Nordic Hills Country Club.
Aug. 19-20.	SAE. West Coast Transportation and Maintenance Meeting. Palace Hotel, San Francisco, Calif.
Sept. 6-10.	A.C.S. Fall Meeting. Pittsburgh, Pa.
Sept. 23-24.	SAE. National Tractor Meeting. Schroeder Hotel, Milwaukee, Wis.
Sept. 30-Oct. 3.	SAE. National Aircraft Engineering and Production Meeting. Biltmore Hotel, Los Angeles, Calif.
Oct. 5-7.	Rubber Division, A.C.S., Fall Meeting. Commodore Hotel, New York, N. Y.
Oct. 5-7.	National Safety Council. 32nd National Safety Congress and Exposition, Chicago, Ill.
Dec. 6-11.	Nineteenth Exposition of Chemical Industries. Madison Square Garden, New York, N. Y.

cost of petroleum, alcohol, or other products from which it is made. Then there may be obstacles to a restoration of production in the East Indies at something like the former cost of the natural product, and production in Latin America may encounter difficulties. He predicted a postwar cost of from 8¢ to 15¢ a pound for synthetic rubber, which he said would not be far out of line with the prewar cost of the natural product. Mr. Jeffers reported again the satisfactory performance of synthetic rubber tires in the smaller sizes, but said that truck tires still required about 30% natural rubber. He pointed to the rapid rate of progress in the technology of using synthetic rubbers and said that the end of such progress was not in sight and that heavy-duty tires with less natural rubber should be possible. He also believes that private industry should be given the opportunity to purchase and run the government synthetic rubber plants after the war.

Somewhat different opinions were expressed by Earl N. Bressman, director of the Inter-American Institute of Agricultural Sciences, on July 15, who said that despite the strides made in producing synthetic rubber, these strides would be matched by plantations in the Western Hemisphere, which after the war will hold their own against other competition. Nearly 30,000,000 budded trees already have been produced in Latin countries, he explained. Price will be an important consideration in the competition between the natural and the synthetic product, he stated, and the natural product is much cheaper. Dr. Bressman said that it should be possible to produce natural rubber at a price of 10¢ a pound; while synthetic rubber, in spite of large-scale production and intensive research during the next few years, will cost around 30¢ a pound if made from petroleum and 40¢ a pound if made from grain.

Earlier in the month, P. W. Litchfield, Goodyear chairman, while in San Francisco, Calif., stated that there will be plenty of synthetic rubber by next fall, but it will not be available for ordinary driving until spring. There will be plenty of tires then unless we have a shortage of manpower for their manufacture, he said. The synthetic rubber being manufactured in the government plants is not quite so good as natural rubber, and the tires will heat up more and will not last so long. Prices of tires will be fixed by the government for the duration and maybe afterward. There is a possibility that this country may never return to the large-scale use of natural rubber, he added.

In a public statement on July 18, J. P. Seiberling, president of the Seiberling Rubber Co., said that while the job of producing quantities of raw synthetic rubber had been virtually accomplished, many problems of building it into satisfactory tires and tubes had not. At the same time millions of tires are wearing "perilously thin." There will be very, very few new tires of all-synthetic rubber this year, and it will probably be the middle of next year before civilians can get the new tires they need. Because our stockpile of natural rubber is now getting low, the government has ordered all passenger tires and tubes made entirely of synthetic rubber, and it is a tough job, he declared. It took the industry 40 years to build natural rubber tires up to the fine point of quality, safety, and service that we had before the war, and now we are trying to equal those standards in a few months' time with tires made entirely of synthetic material that takes longer to process than natural rubber, takes more machinery, and more labor. The only solution for the motorist is for every driver to take extra care of his present tires until the "critical period" through the first half of 1944 is past.

A similar opinion was expressed by F. B. Davis, Jr., chairman of the board of U. S. Rubber, in a statement in Los Angeles on July 19. Although he predicted that by the end of 1944 American production of synthetic automobile tires will have reached the rate of one every second, rationing will still be necessary even if military needs remain static. In 1942, he said, the production of synthetic rubber by the entire industry was 22,000 tons; while the production of July, 1943, alone will equal that figure.

Truman Committee Questions Rayon Cord Use

The Senate Truman Committee in a report on the comparative merits of rayon and cotton tire cord made public on July 17 said that the War Department made its original decision in favor of rayon cord without the benefit of any adequate tests or scientific evidence. The report stated that the decision was first based on the theory that cotton would not stand the heat generated in a synthetic rubber tire and that now the War Department had changed its position and relied on the argument that the cotton had less resistance to "bruise break" in synthetic rubber tires. The report also stated that certain officials of the War Department who have had much to do with the tests came to the Department from companies which are among those who have for several years advocated the use of rayon cord. The effect of the War Department's predilection for rayon, whatever the merits of the controversy, will be a disaster to the postwar economy of the South—a loss of 10% of the domestic cotton market, it was said. This consideration would be secondary if the superiority of rayon had been scientifically demonstrated. However, since rayon has not been shown to be superior, and since the new plants involved in the rayon expansion program are large, the Committee held that further rayon expansion should be deferred until thorough scientific tests are conducted to determine whether further expansion is necessary.

Acting Secretary of War Robert P. Patterson in a statement issued on the same day that the Truman Committee report was made public said that the use of rayon cord in large, heavy-duty tires was necessary because the rayon cord was better and safer than cotton cord, particularly with synthetic rubber tires; and since the Army must use synthetic rubber, there was no choice. We cannot take chances with the tires on airplanes, armored cars, artillery guns, and trucks that the soldiers are using in battle, he emphasized. These things mean soldiers' lives. The decision of the War Department to use rayon cord rests on field tests and on the considered opinion of officers and civilians in the War Department who have spent most of their lives in the development and production of tires and are patriotically devoting their skill and experience to the service of their country in this war. This decision also has the support of the Rubber Director, who has made the same decision with respect to tires for civilian uses, Mr. Patterson further declared. The decision is also supported by practically all the tire industry, and it is also to be borne in mind that the tire industry has a heavy investment in cotton mills.

At the same time Rubber Director Jeffers, when shown the statement issued by the Truman Committee, said that although the Committee says that there is no proof that rayon cord is better than cotton cord for use with synthetics, experts of the Army, the industry, and his office disagreed. He added he would trail along with those who have had a lifetime of experience with tires and tire-testing, particularly when essential truck and bus transportation, the civilian economy, the outcome of battles and the lives of soldiers are the price of being too late with too little without an insurance policy.

Tire Conservation Again Emphasized

Late in the month the Rubber Director informed the oil industry and the Petroleum Industry War Council, which are sponsoring a nationwide tire recapping campaign, that only the most essential motorists will get any new tires for at least the next 12 months despite optimistic rumors to the contrary. The very few experimental synthetic tires now being made and scheduled to be made during the next few months are just a drop in the bucket compared with the need, he said. No immediate large-scale relief is in sight since America's newly developed synthetic rubber industry must be diverted first to hundreds of military needs. William R. Boyd, Jr., the War Council chairman, pointed out that if the average motorist wanted to keep rolling, he must take extra care of his present tires and, what is most important, have them recapped as soon as necessary. There is still plenty of reclaimed rubber for recapping, and the oil companies through their service stations are embarking on an intensive campaign to inform motorists of the necessity of recapping.

Other developments during the month were the announcement by Schenley Distillers Corp. of the promising results obtained with the pilot-plant production of butadiene using the 2,3 butylene glycol process, as originally developed by the Department of Agriculture, and the shift of the Rubber Development Corp. from under the control of Secretary of Commerce Jones to the control of the newly appointed Director of the Office of Economic Development, Leo T. Crowley, after the President abolished the Board of Economic Warfare following the flare-up between Vice President Wallace and Mr. Jones regarding the activities of the Wallace directed bureau.

Changes in Rubber Goods Price Schedules

A uniform provision for adjustable pricing, effective July 2, was added to: RPS 56—Reclaimed Rubber (Amendment No. 3); RPS 66, as Amended—Retreaded and Recapped Rubber Tires and the Retreading and Recapping of Rubber Tires (No. 4); RPS 87, as Amended—Scrap Rubber (No. 6); MPR 107—Used Tires and Tubes (No. 11); MPR 131—Camelback (No. 3); MPR 143—Wholesale Prices for New Rubber Tires and Tubes (No. 6); MPR 200—Rubber Heels, Rubber Heels Attached and Attaching of Rubber Heels (No. 8); and MPR 229—Retail and Wholesale Prices for Victory Line Waterproof Rubber Footwear (No. 6). At the same time OPA revoked a provision for adjustable pricing in Supplementary Regulation No. 14, through Amendment No. 190, effective July 2. This provision was written in because increased cost of crude rubber led to the anticipation of higher ceilings on sales of rubber products to government agencies. But the agencies have arranged to meet such costs of the rubber by means which will not affect ceiling prices; so the provision is no longer needed.

The provision incorporated in the eight other regulations gives any person the privilege of selling at a price which can be increased up to the maximum price in effect at the time of delivery, but prohibits anyone from delivering or agreeing to deliver at prices to be adjusted upward in accordance with action taken by OPA after delivery, unless he is authorized by OPA to do so. Such authority may be granted only if it "is necessary to promote distribution or production, and if it will not interfere with the purposes of the Emergency Price Control Act of 1942, as amended." In such cases it will be issued in an order by the Price Administrator or an OPA official to whom the authority is delegated.

Reductions in the maximum prices of neoprene hose and belting to reflect the decreased cost of neoprene are ordered in Amendment 12 to MPR 149—Mechanical Rubber Goods—effective July 20. The new specific prices for neoprene hose and the percentages for reducing maximum prices of neoprene belting follow establishment of a price for neoprene effective July 1 at 27½¢ a pound. This synthetic rubber had been reduced April 1 to 45¢ a pound from 65¢. Amounts of the reductions in prices of the mechanical goods affected by Amendment 12 vary with the proportion of neoprene used in their manufacture.

In the course of preparing the amendment OPA held consultations with individual members of the industry and one full day's conference with the Mechanical Rubber Goods Advisory Committee in New York on June 23.

Other modifications made by Amendment 12 simplify and clarify the order.

Specific consumers' ceiling prices are given in Table I-D of Appendix D for fuel oil and gasoline hose, oil suction and discharge hose, hydraulic control and industrial grease hose, spray hose for paint, tank car and tank truck hose, and other types of neoprene hose.

Manufacturers' prices to various other classes of purchasers are determined by deducting from the consumers' net prices the discounts, allowances, and other deductions the manufacturer had in effect to the class of purchaser on October 1, 1941.

A method is given for arriving at the ceiling prices of constructions and sizes of the specified hose not listed in the table.

Manufacturers determine maximum prices for neoprene V-belts and neoprene conveyer belting by deducting from their list prices of October 1, 1941, a specific discount given in the amendment. They then deduct from the resulting figure all discounts, allowances, and other deductions in effect to a purchaser of the same class on October 1, 1941.

The other changes in the amendment:

Standardize the charge manufacturers may add to the ceiling for the carcass of conveyer, transmission, or elevator belting when it is produced with a skim coat besides the friction coat. This is 10% of the carcass price and is established in line with the industry practice on the base date in charging for those additional thin layers of rubber compound included to increase the belt's resistance to strain.

Provide that the maximum prices established shall be adjusted to the nearest fraction of a cent that the seller customarily used in pricing products in the same line.

Add an adjustable pricing provision to the regulation which is uniform with the standard provision added to other price regulations.

Revise the definitions of "regularly quoted price", "purchaser of the same class", and "standard list item" so that the first-mentioned term shall be precisely defined and so that the other two terms are shown as being applicable to all persons covered by the regulation.

Amendment 8 to MPR 300—Maximum Manufacturers' Prices for Rubber Drug Sundries—effective June 30, reads that the distributer's price on January 1, 1941, for sundries in Appendix A, if above ceilings set in the regulation, shall be the maximum price for these items.

Dollars and cents ceilings that may be charged by manufacturers, wholesalers, and retailers for fountain syringes of reclaimed rubber, now permitted under WPB specifications, adopted by OPA, effective July 9, are established for the first time under Amendment 9 to MPR 300 and Amendment 7 to MPR 301—Retail and Wholesale Prices for Rubber Drug Sundries. No ceilings for newly manufactured fountain syringes had been given previously as rubber fountain syringes were not being made. Carry-over stocks made from crude rubber have been sold by manufacturers under maximum prices established by the GMPR. The ceilings for newly made fountain syringes are in line with maximum prices of other rubber drug sundries, being substantially the same as prices for similar products on December 1, 1941. At the manufacturers' level they are 2¢ above prices at which hot water bottles bearing the same brand are sold. This regulation is in harmony with industry pricing practice, and was adopted after extensive consultation with industry members.

Other action in Amendment 9 corrects an error made in an earlier amendment in numbering two sections.

Both amendments define more clearly what type of adjustable pricing is permitted, in language uniform with that of adjustable pricing provisions in other regulations. Thus, they state:

"Any person may agree to sell at a price which can be increased up to the maximum price in effect at the time of delivery; but no person may, unless authorized by the Office of Price Administration, deliver or agree to deliver at prices to be adjusted upward in accordance with action taken by the Office of Price Administration after delivery."

The amendments state the conditions under which such authorization may be issued by the OPA and by what officials of the OPA. Such authorization will be given by order.

Dollars-and-cents ceiling prices for raincoats made originally for enlisted army men and WACS, but rejected by the government as less than perfect, were established by OPA for all civilian sales except those at retail.

The maximum prices established in Amendment 10 to MPR 220—Certain Rubber Commodities—effective July 23, are $4.80 to retailers, $4 to other distributers for rejected enlisted men's raincoats, and $6 to retailers and $5 to other distributers for rejected WAC raincoats.

Fabrics made wholly or partly of rubber or substitute rubber which have been rejected by the government also have been given ceiling prices, at the manufacturer level, and are set at 75% of the contract price for the perfect fabric.

The amendment also includes an adjustable pricing provision identical with those in several other regulations.

The "government rejects" formerly were priced, where possible, by a formula contained in the regulation, but as few sales of them were made on the base date, many had to be priced by special OPA order.

Retail sales of the rejects will be priced under the General Maximum Price Regulation as at present until specific prices are assigned.

Representatives of the corset and allied products industry will be consulted by OPA regional offices early in August to discuss proposed plans for a regulation controlling prices on all their products. Brassieres, corsets, garters, girdles, girdle blanks and foundation garments containing rubber are now governed by MPR 220. The same products, when rubberless, are priced under GMPR, together with garter and sanitary belts. The proposed regulation would bring all these related products into one regulation, whether or not they contain rubber. It is felt that by holding the meetings in regional offices rather than in Washington, a larger representation will be possible; and large and small manufacturers will have equal opportunities to express their views on local or operational problems.

Amendment 9 (July 8) to MPR 200—Rubber Heels, Rubber Heels Attached and Attaching of Rubber Heels—adds to the table in section 1315.1420 (g) (5) of the regulation "Verticord" brand of heels made by the O'Sullivan Rubber Co.

OPA recently issued a correction on MPR 403—Certain Rubber Commodities Purchased for Governmental Use—covering the table in Schedule B of section 22 *Appendix C: Form for application for adjustment.*

Tire Ceilings Rulings

MPR 415—Certain Federal Government Purchases of New Rubber Tires and Tubes — effective July 1, which supersedes TMPR 31, establishes ceiling prices for new rubber tires, tubes and flaps, listed by the Treasury's procurement division, for sales to the federal government, except to the War and Navy Departments, Defense Supplies Corp., and Rubber Development Corp. The maximum prices given take into account additional expense sometimes incurred in sales to Lend-Lease and other government agencies; therefore no additionals for such expenses may be added to them. In the case of passenger-car tires and tubes no additions are allowed to prices for costs of the Dealer Tire Return Plan unless the tires and tubes involved actually have been turned into the government pool.

Some items not on the procurement division price lists are added to the regulation at prices in line with those on the lists. Flaps are listed separately because they are being bought separately at present although both casings and flaps have been included in tire prices on current lists.

Issuance of the regulation is considered necessary, OPA said, because of the large volume of new rubber tires and tubes sold to the government, and because they are sold under conditions which differ from those on sales to civilians. Sales to the War and Navy Departments are not covered because they usually buy directly from manufacturers instead of through the Treasury's procurement division. Defense Supplies Corp. and Rubber Development Corp. are not covered because they buy tires and tubes for resale when wartime conditions make that seem desirable.

OPA consulted with government procurement officials and members of the industry in preparing MPR 415. It sets prices lower than the retail ceilings on tires and tubes established for civilians in RPS 63—Retail Prices for New Rubber Tires and Tubes — and supersedes that schedule for sales to the government.

Specific maximum prices became effective July 2 for the supply of tire mileage and servicing of rubber tires and tubes furnished to operators of buses and taxicabs under tire mileage contracts. Rates are established, either per tire mile or per vehicle mile, in MPR 414—Tire Mileage.—The action establishes a uniform ceiling for the industry in proper relation to the March, 1942, level of rates, but permits adjustment of individual rates to level out abnormalities and to keep them adjusted to changing operating conditions. Returns to the manufacturers are roughly comparable to the prices at which tires are normally sold to commercial tire users.

Chiefly affected are five of the largest tire manufacturers, who supply more than 90% of the tire mileage sold in the United States. Tire mileage is bought by about 1,000 users, as owners of fleets of buses, who spend about 15 million dollars a year for the service.

Since August 19, 1942, tire mileage rates have been frozen at the March, 1942, level by MPR 165 as amended; but the freeze ceiling method caused abnormalities in the relation between rates. Therefore MPR 165 is superseded by MPR 414, which also supersedes provisions relating to tire mileage, termination sales, and transfers of tires and tubes under tire mileage contracts in other regulations and price schedules. These regulations are amended, also effective July 2, as follows: MPR 107 — Used Tires and Tubes (Amendment 10); 165—Services (Amendment 24); and RPS 63—Retail Prices for New Rubber Tires and Tubes (Amendment 12); and RPS 66—Retreaded and Recapped Rubber Tires and the Retreading and Recapping of Rubber Tires (Amendment 3).

Maximum prices for servicing tires and tubes not owned by the supplier of the tire mileage are established at $0.001 per vehicle mile for a six-wheel vehicle. The rates for vehicles with other than six wheels are proportionately more or less.

Mileage rates for tires are found in two tables in Appendix A; Table I is for trucks and bus tires, and Table II for passenger-car and motorcycle tires. They cover the supplying and servicing of pneumatic tires and tubes and of any flaps used with them.

Rates established were obtained by discounting retail ceiling prices by percentages that resulted in commercial prices, and dividing the results by the various mileage figures.

Provisions covering bonus provisions relate to the March, 1942, base period previously used. These and other provisions, as well as the formulas given in the regulation for use of the pricing tables in Appendix A were carefully checked with representative members of the industry, as well as with the facts and experience at command of the OPA.

Footwear Rationing Notes

Ration Order 6A—Men's Rubber Boots and Rubber Work Shoes—underwent revisions, effective July 14. Amendment 1 authorizes the Office of Civilian Defense to secure ration certificates, by applying direct to the OPA in Washington, for men's rubber boots for personnel performing essential services for the OCD. The second amendment clarifies procedure for refunding ration certificates to customers who return unused rubber boots or work shoes to retailers. The customer's original ration certificate must be returned if on hand; otherwise the dealer may give any available certificate valid for the same type and quantity of the footwear returned, and he must endorse the certificate by writing on the back the name and address of his establishment, the word "to", and the customer's name.

Amendment 25 (July 7) to RO 17 adds, among others, to non-rationed footwear baseball, track, and football shoes. Among other provisions of the amendment is a new specification defining rubber-soled shoes which directly affects manufacturers' operations as well as dealers' inventories. In line with a recent WPB directive concerning rubber soles, the shoe ration order now specifies that all shoes containing any rubber in their soles are rationed except where the rubber is used only as a cement or adhesive for attaching soles, platforms, or uppers. However there are certain minor exemptions limited to rubber-soled stocks now in the hands of retailers, wholesalers, and manufacturers, or which were manufactured before July 16, 1943. The exempt clause provides that shoes made wholly of materials other than leather, (except for permitted use of leather top lifts), which are completed, packaged, and shipped from the factory before July 16, 1943, may be sold as non-rationed if the soles are of one of the following constructions: (a) principally of rope, fabric, or fiber in which rubber is used primarily as a binder; (b) principally of wood, in which rubber is used only as toe or heel inserts and covers not more than 25% of the area of the bottom of the sole. Manufacturers must mark the month and year packaged on one shoe of each pair of such shoes shipped after July 15. Such marking automatically denotes them as rationed shoes.

OPA clarified this action by explaining that although rubber-soled shoes are rationed, under the former definition, there has been some misunderstanding in the trade about the status of shoes having fabric or rope soles impregnated with rubber, and those having scrap rubber, latex or similar rubber products in the soles. Many shoe establishments have quantities of such footwear in stock or in process of manufacture, and it is now rationed under the new definition. However to make use of the materials and to allow dealers to dispose of stocks already made up, ration-free transfers of any such shoes completed, packaged, and shipped from factories before July 16 is authorized.

Amendment 28 to Ration Order 17—Shoes—effective July 15, postpones for an additional month, until August 15, the time manufacturers will be granted to complete and ship as non-rationed certain shoes made with rubber in their soles. More time was found needed to complete the shoes already in process.

Other OPA Rulings

Amendment 1, RMPR 180—Color Pigments—exempts red lead and orange mineral color pigments from the regulation. They will continue under GMPR until a separate regulation on lead pigment paints is issued.

Amendment 16, Rev. SR 1—Aviation Gasoline and Components—effective July 6, discontinues provisions requiring the fil-

ing of contracts, or summaries of them, for the sale of aviation gasoline, synthetic rubber, toluene, and agricultural components. These provisions had already been revoked by amendment to Supplementary Regulation No. 1 but were included in Rev. SR No. 1.

Amendment 21 to Rev. SR1 to GMPR, effective July 27, exempts from price control all catalysts sold for use in making synthetic rubber, aviation gasoline, and toluene from petroleum. This action is in line with the OPA policy of removing from price control commodities to which price control cannot readily be applied without seriously handicapping the production of military supplies or whose economic value is insignificant.

According to 2nd Rev. Max. Export Price Regulation, Amendment 2, sales by subsidiaries and agents of exporters in the continental United States, when made in the territories and possessions, are to be in accordance with the regulations applicable to sales in the territories and possessions, and not under the Second Revised Maximum Export Price Regulation.

Amendment 16, MPR 188—Manufacturers' Maximum Prices for Specific Building Materials and Consumers' Goods Other Than Apparel—effective July 20, in indicating that only those types of goods or parts specifically listed in the appendix to the regulation are governed by pricing methods for manufacturers' ceilings on specified building materials and consumers' goods other than apparel, clarifies application of the regulation by listing in greater detail items already covered, including rebuilt, reconditioned, and remodeled articles; it also adds certain classes of new articles to its coverage. As a typical "part" not covered by MPR 188 are mentioned rubber sacs for fountain pens. The listing of health supplies, equipment, and sub assemblies thereof has been modified to exclude rubber druggists sundries, now covered by MPR 300. Included under MPR 188 are sporting goods made of new materials (except clothing and shoes) and reprocessed golf balls with used centers, poker chips, and certain clothing designed for protection against specific industrial hazards.

Deliveries of butyl alcohol by producers may be made after July 1 on an adjustable pricing basis, according to Amendment 5 to MPR 37, in recognition of uncertainty in the selling price of grain by CCC after that date and the need of preventing any possible interruption in production and delivery of this important chemical.

Amendment 6 to MPR 37—Butyl Alcohol and Esters Thereof—effective July 1, because of the uncertainty of grain supplies and prices, establishes new ceilings for grain fermentation butyl alcohol and butyl acetate and authorizes monthly price adjustments in line with the actual prices paid for grain by the producers of these products.

Among the 64 members of the recently formed Cotton Weavers' Industry Advisory Committee are: H. Baetjer, Mt. Vernon-Woodberry Mills, Inc., Baltimore, Md.; J. R. Flather, Boott Mills, Lowell, Mass.; R. C. Dick, Naumkeag Steam Cotton Co., Salem, Mass.; H. A. Burow, Bonham Cotton Mills, Bonham, Tex.; N. E. Elsas, Fulton Bag & Cotton Mills, Atlanta, Ga.; C. E. Hatch, Brandon Corp., Greenville, S. C.; C. B. Hayes, Pacific Mills, Lyman, S. C.; S. Russell, Bibb Mfg. Co., Macon, Ga.; C. A. Cannon, Cannon Mills Co., Kannapolis, N. C.; and H. L. Bailey, Wellington Sears Co., Inc., A. L. Bonsal, Joshua L. Baily & Co., S. F. Dribben, Cone Export & Commission Co., T. W. Estes, J. P. Stevens & Co., Inc., G. M. Miller, Turner Halsey Co., J. K. Whitaker, Hesslein & Co., Inc., P. B. Baldwin, Collins & Aikman Corp., F. G. Kingsley, Deering, Milliken & Co., Inc., R. D. Williams, Jr., Callaway Mills, and D. B. Tansill, Pepperell Mfg. Co., Inc., all of New York, N. Y.

Tire Rationing Revisions

RO 1B, effective July 12, covers tire rationing regulations for Puerto Rico and supersedes the Revised Tire Rationing Regulations insofar as applicable to the territory.

R O 1D, effective July 1, covers the rationing of tires, tubes, recapping, and camelback in the Canal Zone.

Admendment 1 to Supplementary Directive 1Q as amended February 15, 1943, and SD1Q as amended July 1, 1943—Rationing of Tires, Tire Casings, Tire Tubes, Etc.—cover the importation of tires, tubes, etc.

RO 1A—Tires, Tubes, Recapping, and Camelback—has been further amended. Amendment No. 35, beginning July 1 and extending probably for 90 days, reduces the number of low-mileage passenger-car drivers eligible for used and recapped tires because of a temporary shortage in supplies of these casings in serviceable condition, following the statement of Rubber Director Jeffers that he would have to reduce the rationing allotment of Grade III tires. The July figure was given as about 500,000, against 800,000 in June. Thus in the gasoline shortage area, where the 90 miles a month in an "A" book is for nonoccupational driving, drivers with only "A" books cannot get replacements, but may still have their tires recapped without a rationing certificate; where the "A" book is good for 240 miles a month, the applicant must show he uses his car for an essential purpose, that, where possible, he has formed a ride-sharing club, or establish the lack of reasonably adequate alternative means of transportation, among other conditions, to get a Grade III tire.

Amendment 36 (July 6) removes the limit, previously five, on the number of times replenishment portions of tire rationing certificates may be transferred from hand to hand within the trade. This move, necessitated by the decreasing inventories of tires and tubes, allows unlimited "shopping" among the trade to secure needed supplies. The same change was made with respect to the transfer of receipts given dealers by agencies authorized to purchase tires without rationing certificates. The next amendment, effective July 10, reads that RO 1A applies to the 48 states and the District of Columbia and to all transactions between the continental United States and its territories and possessions.

Amendment 38, effective July 20, removes rationing restrictions on sale of used solid tires to encourage their use by truck operators who would otherwise have to get new tires. Stocks of used solid tires on June 14 totaled about 1,000. Amendment 38 carries also three other changes to the rationing regulations. The first relates to classification of rental cars to determine tire eligibility; they are considered "passenger automobiles" only if rented for periods of more than 30 successive days; otherwise they are subject to "commercial vehicles" rulings, in accordance with new ODT regulations. Previously cars rented for periods exceeding seven consecutive days were treated as "passenger automobiles" for tire rationing purposes. The second change permits, to avoid inconvenience and delay, dealers to sign Parts "B", "C", and "D" of a rationing certificate for a consumer if the latter has signed Part "A" and the purchase is being made by mail. The third change provides for issuance of a certificate for a used truck tire to be mounted on a farm tractor or implement where a front-wheel tractor tire, implement tire, industrial tire, or Grade III tire of suitable size is not available.

No. 39 (July 24) relates to spare tires. No new tires will be rationed for spares during the next few months to any drivers except a relatively few, such as firemen and doctors who sometimes have to use their cars at high speeds. Neither new nor used or recapped tires can be obtained by drivers who have four sound and serviceable tires plus one that can be made to serve as an emergency spare. Drivers who do not have a fifth tire suitable even for occasional emergency use will be eligible to get a certificate for a used or recapped casing for a spare. This new action followed the request of the Office of the Rubber Director to make the present stock of tires last until new synthetic casings can be produced in sufficient quantities. It marks a departure from the previous rule under which eligibility for replacement of spares was determined in the same way as eligibility for replacements on running wheels.

Amendment 40, effective July 24, authorizes the OPA in Washington, D. C., to receive and act upon applications for certificates for tires, tubes, or recapping service for privately owned vehicles operated by officers, agents, or employes of the Army, Navy, Marine Corps, Coast Guard, and the law enforcement agencies of the United States, who use such vehicles in the performance of official duties which depend upon secrecy.

Amendment 41, effective July 19, authorizes dealers having in stock used passenger tires unfit for recapping, but which can be made serviceable for emergency use by temporary repairs, to brand them with an "O" on the sidewall and sell them, with or without repairs, to consumers holding Grade III ration certificates. The OPA District Office must be notified not later than the tenth of each month the number of tires branded in the preceding month. Dealer inventory of these tires is about 2,000,000. Thus branded, these casings will be the same as the "Emergency Tires"

dealers recently were authorized to buy from Defense Supplies Corp. through the Rubber Manufacturers' Association of America, Inc.

Other provisions of Amendment 41 are: (1.) Driving a recappable tire carcass to the point where it is worn through the "breaker strip" will be considered evidence of tire abuse, which may result in the denial of future applications for gasoline or tire rationing certificates. (2.) Inspectors are not to sign a Tire Inspection Record authorizing continued operation of a vehicle if any tire is a recappable carcass worn to the breaker strip. (3.) A dealer or manufacturer may sell to a consumer, on a Grade III certificate, a passenger tire in need of recapping but not worn to the breaker strip.

WPB Orders

Rubber Order R-1 by its first amendment (July 10) extends application of the order's inventory restrictions. Originally the order included in its inventory restrictions only industrial-type tires and tubes. These restrictions, limiting manufacturers of new equipment to a 30-day inventory of tires and tubes, have now been extended to apply to manufacturers of new vehicles in the following groups: Passenger and motorcycle tries and tubes; truck, bus and special-purpose tires and tubes; farm tractor implement tires and tubes; bicycle tires and tubes; and airplane tires and tubes. The amendment also adds molded wheels and casters of all types to the list of rubber products permitted for civilian manufacture (Schedule A), and removes the restriction on the use of rubber for the manufacture of molded casters for government orders (Schedule B).

A recent announcement from the Rubber Director stated that manufacturers may make of synthetic rubber any odd or obsolete sizes of tires. Heretofore manufacturers had been forbidden to produce any sizes of the synthetic except the two standards, 6.00-16 and 6.50-16. Each manufacturer is now permitted to build any size up to a 60-day inventory.

Allocation Order M-184, as amended July 5, gives specific instructions for the use of forms and certificates in the allocation of aniline.

Amended Order M-215 (June 25) changes procedure for filing applications and reports for delivery and use of glycols.

Conservation Order M-103 was amended July 3 to extend restrictions on the sale and use of dyestuffs and pigments to cover all but four specific dyes, known as "Lake colors."

Consumers' Goods Inventory Limitation Order L-219 underwent extensive revision July 10. One change defines footwear, as subject to the order, "as the following items, regardless of the materials of which they are made: all types of shoes, including athletic shoes, slippers, moccasins, sandals, rubbers, rubber boots, sneakers, waders, arctics, overshoes, galoshes, and the like."

Limitation Order L-201—Automotive Tire Chains, Tractor Tire Chains, and Chain Parts—as amended July 10, sets the quantities of chains that may be made from April 1, 1943, through March 31, 1944. Also, after August 1, 1943, manufacturers are forbidden to make chains for the 6.00-16-size passenger tire except in the "light car special" type. The ratio of chains to chain parts is increased for passenger automobile and for commercial vehicle tire chains.

Supplementary Allocation Order M-326-a, as amended July 9, changes procedure for filing applications and securing monthly allocations of cellulose plastics.

Personnel Mention

The War Production Drive Headquarters recently released another list of the nation's workers honored for suggestions to increase industrial efficiency, conserve manpower, and reduce safety hazards. Recipients of Certificates of Individual Production Merit included Albert Dietrich, J. M. Ulichney, and Amelia Schartoff, all of Titeflex Metal Hose Co., Newark, N. J. Letters of Honorable Mention went to R. F. Clark, Jr., Dominick Pirozzo and S. A. Guidetti, all also of Titeflex, A. I. Beaune, General Electric Co., Cleveland, O., and George Mager, E. I. du Pont de Nemours & Co., Inc., Barksdale, Wis.

Harry L. Bailey and George M. Miller, presidents, respectively, of Wellington Sears Co., and Turner Halsey Co., both of New York, N. Y., are on the Cotton Textile Merchants Industry Advisory Committee.

E. J. Costa, of Crown Cork & Seal Co., Baltimore, Md., is a member of the Crown Manufacturers Industry Advisory Committee.

Wm. E. Belke, president, Belke Mfg. Co., Chicago, Ill., belongs to the Electroplating & Anodizing Equipment Manufacturers Industry Advisory Committee.

Albert M. Kahn, president of Consolidated Products Co., Inc., New York, N. Y., is a member of the Used Equipment & Machinery Industry Advisory Committee.

The following constitutes the recently appointed Asbestos Friction Material Industry Advisory Committee, with W. T. Meloy government presiding officer: Hubert F. Groendyke, Raybestos-Manhattan, Inc., Passaic, N. J.; R. E. Spokes, American Brakelock Co., Detroit, Mich.; W. Harvey, Thermoid Co., Trenton, N. J.; E. H. Wells, Johns-Manville Corp., New York, N. Y.; C. E. Harwood, Russell Mfg. Co., Middletown, Conn.; W. Nanfeldt, Worldbestos Corp., Paterson, N. J.; Howard Snow, Southern Friction Materials Co., Charlotte, N. C.; J. G. Brown, Grizzly Mfg. Co., Paulding, O.; and Walter Dodge, Freodo & Asbestos Co., New Brunswick, N. J.

Specialty Synthetic Rubbers

The branch of the Rubber Director's Office under E. L. Gilliland on research and development of synthetics has a section on specialty synthetic rubbers which has investigated a large number of synthetic rubbers other than those of the large volume rubbers as GR-S, GR-I, and GR-M and is willing and anxious to provide information to manufacturers of rubber products on the relative merits of these specialty rubbers for various applications. About a half a dozen of these rubbers have been found to be particularly useful for certain purposes, and interested manufacturers who may be planning to investigate such rubbers may save themselves considerable time and effort if they will contact this section for technical information. The personnel of this section consists of the following: Harry L. Fisher, Leon Healy, J. E. Hutchman, Noel Lanham, Rae Paul, and P. H. Watkins, and they may be reached in Room 4012, New Municipal Center Bldg., Washington, D. C.

Army News

War Department, Washington, D. C., has developed a new-type plastic insole for the jungle boot. The insole, consisting of fine layers of plastic screening, four of coarse mesh and the other fine, permits maximum ventilation between the foot and the rubber sole of the boot, keeps the foot dryer, and may be easily sterilized by washing with soap and water. Field tests indicate that a sharp reduction in fungus foot diseases may be expected from using this insole.

Saving four highly critical materials, the Quartermaster Corps, in collaboration with a commercial band instrument manufacturer, has developed a fife for use in Army bands and drum corps in a plastic material known as cellulose acetate butyrate. Heretofore fifes had been fabricated of rubber, cork, brass, and nickel. Plastics have already been utilized in the manufacture of the Army bugle.

The War Department and the Office of the Rubber Director have evolved a plan whereby more than 100,000 Army tires no longer suitable for severe service will be made available for civilian use through regular trade channels. Nearly all are truck tires of the cleated type, and most are suitable for farm trucks; few passenger-car tires will be released. As more unserviceable Army tires appear in future, they too will be offered the public.

The Advisory Board to the Research and Development Branch, Military Planning Division, Office of The Quartermaster General, has been increased to 98 scientists and industrialists representing nearly every field of research, manufacturing, and industry. Among the more recent members are: Ernest B. Bonger, director, technical division, rayon department, E. I. du Pont de Nemours & Co., Inc., who will cover cellophane and acetate films, viscose and acetate rayon, and nylon; Lyman J. Briggs, director, National Bureau of Standards, material and product testing; Wm. D. Coolidge, research director, General Electric Co., metals, plastics, high frequency, and technical devices; Milton Harris, research director, Textile Foundation, research on textile fibers, fabrics, and finishes; Ernst A. Hauser, Massachusetts Institute of Technology, latex and colloid chemistry; A. E. Lacomble, president, Shell Development Co., lubricants, solvents, plastics, synthetic rubber.

EASTERN AND SOUTHERN

Electronics by Westinghouse

A new central organization of the Westinghouse Electric & Mfg. Co. to promote the use of electronics on a broad engineering and commercial basis was announced July 7 at a symposium on electronics held at the Hotel Astor, New York, N. Y., for a large group of editorial writers of the technical and trade journals. This new organization, which will supplement the company's present electronic divisions in various fields such as radio, tubes, control, and power conversion, will be headed up by two senior engineers, Gordon F. Jones and Carl J. Madsen, in the industry engineering group under A. C. Monteith, manager industrial engineering; while Amos J. Germain will be in charge of commercial relations.

"Electronics at Work", an educational picture released by Westinghouse, which explains the six basic functions of electronic tubes and shows how each type of tube is used in some of the latest industrial and military applications, was first shown. This was followed by a talk on "Trends in Electronics" by Mr. Monteith, who explained that electronics is that which has to do with the action of electrons and that such a general definition includes, heat, light, magnetism, and electricity. In the industrial field probably $500,000,000 worth of business has been done in the last three years, excluding radio and Radar. Electronics is a going business, and if applications are kept on a sound basis, there should be no question about the future of electronics in industry, he said.

In a talk on "Electronics in Industry", Mr. Madsen explained that developments in electronics could be best explained by breaking down the applications into nine classifications: rectification, inversion, high-frequency heating, communications, measurements, control, inspection and sorting, precipitation, and radiation. He then discussed some of the applications in these classifications such as the use of high-frequency heating in bending plywood and the heating and curing of plastic materials. The conservation of tin in making tin plate was made possible by the application of this type of heating. High-frequency power in one of these installations equals the total power of all our conventional broadcasting stations. In the field of communication, important developments in the past year or so will lead to vast expansion in the number of frequency modulation and television sets after the war, it was said. In the field of electronic devices for making measurements, new developments during the past few years include dynetric balancing, the electron mass spectrometer, the cathode ray, oscilloscope stroboglow, and many others. At the present time the most useful application of the electron mass spectrometer is in the petroleum and synthetic rubber industries for the analysis of hydrocarbons and other compounds used in the production of motor fuels and synthetic rubber. The use of industrial X-ray and photo-electric devices for the inspection and sorting of products in many industries will undoubtedly be extended considerably in the near future. Radar, the great development of this war, will have many applications in the transportation industry when the demand for military equipment has passed.

"Electronic Conversion of Power" was the subject of the talk by Mr. Jones. Although almost all power generated today is in the form of alternating current, he pointed out that some leads must be supplied with direct current, and there are others where direct current affords advantages which dictate its selection. The Ignitron rectifier, conceived and developed by Joseph Slepian, of the Westinghouse research laboratory, is a single anode tube rectifier in which many of the difficulties of the early rectifiers have been overcome and is now supplying d.c. auxiliary power in steel mills and for general industrial loads and to small isolated loads in cities where the a.c. network is replacing the Edison systems. Since 1937, when Ignitron rectifiers became commercially available, the Westinghouse company and its Canadian associates have sold in excess of 2,250,000 kilowatts of this equipment.

A question and answer period followed the talks in which a further effort was made to explain the mechanism and application of electronics in specific instances.

Somerset Rubber Reclaiming Works, New Brunswick, N. J., according to President Irving Laurie, discontinued the manufacture of reclaimed rubber and kindred products as of June 30, 1943, but has retained full ownership of the plant and equipment. Laurie Rubber Reclaiming Co., a recently formed partnership, has leased from Somerset all its buildings and machinery and since July 1 has been operating as a reclaiming plant.

Schenley Distillers Corp. plant at Schenley, Pa., which is manufacturing large quantities of alcohol for the synthetic rubber program, is reducing production problems after inaugurating a three-fold training school for supervisors, according to H. C. Phillips, director of personnel and industrial relations, who said success of the classes has been so outstanding that the system will be extended to other plants in the corporation. Originated and made available without cost by the Training Within Industry branch of the War Manpower Commission, the three programs consist of training outlines for supervisory employes in job instruction, methods, and relations.

Oscar Nelson, president, United Carbon Co., Charleston, W. Va., recently sold Morlunda Lan Domino, a prize bull, for $10,000, the highest price ever paid for an eastern-bred Hereford bull.

Foster D. Snell, Inc., consulting chemist and engineer, 305 Washington St., Brooklyn, N. Y., has added to its rubber and plastic Madlyn M. Sheldrick, Asher Wollison, and Irving Merdinger, who was formerly with the United States Rubber Co.

U. S. Rubber Announcements

U. S. Rubber has published a handy chart which gives at a glance the equivalent of fractions in four-point decimals; it will be sent free to engineers and manufacturers applying on their letterhead to United States Rubber Co., Mechanical Goods Division, 1230 Sixth Ave., New York 20, N. Y.

Completion of the most comprehensive tests to date of heavy-duty synthetic-tread-ed tires, covering a full year of operation on buses of the Public Service Coordinated Transport in New Jersey, was announced last month by U. S. Rubber. The synthetic used was Buna S. Many different compounds and types of construction were used to find the most durable and efficient combinations. Consistent improvement was shown in the product during the year, U. S. Rubber engineers said, with mileage running as high as 37,000 miles per tire. They pointed out, however, that each tire was built in four sections, with a different compound in each. When one of these sections was worn through, the tire was removed from the bus. Therefore the mileage established represented that of the worst section, while rubber remained on the others. There were no failures during the entire experiment from any cause other than normal wear, the company said. Synthetic tubes and flaps were likewise used in the experiment with satisfactory results. Most of the tires, moreover, were of the rayon type.

C. N. Suffill, for the past six years director of advertising and public relations for the Lincoln Aeronautical Institute, has rejoined U. S. Rubber as head of the business development department of the Fisk tire division. He had formerly been with the rubber company for 11 years as sales promotion manager of the tire division.

A "War Necessity Service" to keep all essential transportation in operation has been developed for its dealers by U. S. Rubber's Fisk tire division. Keystone of the plan is a schedule of regular inspections for fleet operators and the filling out of truck tire maintenance reports.

Starting at Portland, Ore., and ending in New York, the Fisk tire division last month held a series of distributer and dealer meetings under the direction of J. Chester Ray, sales manager, to acquaint Fisk dealers with the company's developments in the synthetic program, to present a steering program aimed at post-emergency objectives, to cover the tire situation and developments to be expected, and to clarify OPA and ODT regulations and amendments. The division's "War Necessity Service" plan was presented, along with merchandising and service suggestions on repair materials, accessories, and batteries. The synthetic story, dramatized through

chemical demonstrations supported by exhibits, was presented by tire engineers attached to the factory's product development department.

At the July 7 meeting of the Bristol, R. I., Rotary Club, Major J. Heinz, of the Army Signal Corps Headquarters in Washington, and Lt. Col. H. E. Olsen, labor liaison officer for the Signal Corps, stationed in Boston, appealed to the Club members for assistance in the immediate recruiting of 500 workers for U. S. Rubber's plant at Bristol, where lack of sufficient help is holding the production of assault wire to half the monthly quotas assigned by the Army.

New Developments

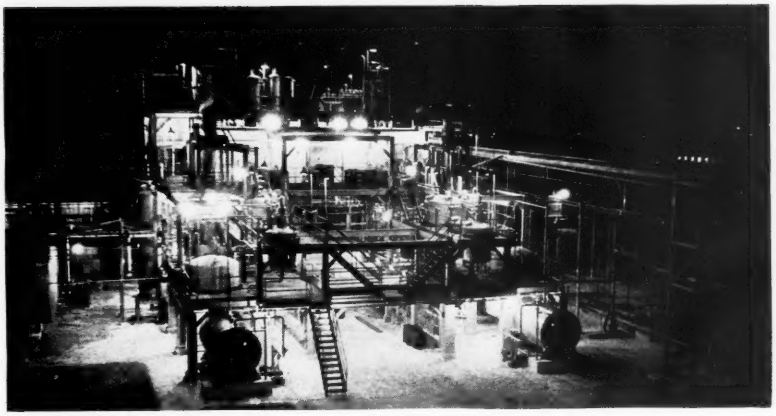
U. S. Rubber has developed new synthetic rubber devices to protect delicate mechanisms of airplanes from desert dust and other foreign matter. One such device, known as a boot and made of lightweight fabric construction and coated with synthetic rubber, is designed to protect hydraulic and all other similar equipment having limited space such as landing gear actuating mechanisms, bomb bay doors, and other mechanically moving parts. The boot can be constructed for installation on planes where struts have already been assembled provided anchorage of ends can be accommodated or arranged for; it will also become an integral part of many new planes now being built.

The company has also announced that certain types of marine pump gears formerly made of metal are now being fashioned of synthetic rubber for installation on landing boats. The cutting action and wear that sand and other foreign matter formerly had on metal gears has been eliminated owing to the abrasive-resistant qualities of synthetic rubber.

Carrier Corp., Syracuse 1, New York, N. Y., through Herbert L. Laube, vice president and head of the engineering division of the air conditioning company, has announced that Wm. L. McGrath has joined its engineering staff. He was formerly with Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Goodall Rubber Co., Inc., Trenton, through the Prudential Insurance Co. of America, Newark, both in N. J., has taken out a group life insurance policy involving $188,500 for the protection of 79 employes. Each worker is to receive life insurance of $1,500, and under the terms of the policy, issued on the noncontributor basis, the employing company assumes the entire premium expense.

American Viscose Corp., 350 Fifth Ave., New York, N. Y., has announced that elastic "Vinyon" has been adopted for use in the waistbands of the exercise uniforms and underwear for women members of the United States Marine Corps. Previously this yarn had been used for the same purpose by the WAC, as well as in other military applications where it replaces rubber. The entire output of elastic "Vinyon" is currently going into war uses.



A View of Alkylation Unit of Government-Owned Styrene Plant Operated by Monsanto Chemical Co. at Texas City, Tex.

Make Reservations Early!

Fall Meeting of the Division of Rubber Chemistry, American Chemical Society. Hotel Commodore, New York, N. Y., October 5, 6, and 7, 1943.

Those who plan to attend the meeting are urged to make early reservations for hotel accommodations and transportation to avoid delays and disappointments.

Lists of papers and schedules of meetings will be announced well in advance, but be sure to make hotel reservations and travel arrangements as early as possible.

Rubber Extender Announced

A new extender, Norab, reported to work very well with natural, synthetic, reclaimed, or scorched rubber, was announced last month by Sam Baron, chemist and manufacturer of synthetic rubber substitutes at 27 W. Third St., New York, N. Y. A demonstration of the preparation and general properties of this material was given representatives of the rubber industry, the Office of the Rubber Director, and the press on July 8. Tests are being conducted by certain rubber and chemical supply companies in collaboration with the research compounding branch of the Office of the Rubber Director, and results should be available within two or three weeks.

Society of Chemical Industry, 305 Washington St., Brooklyn, N. Y., has awarded the Chemical Industry Medal for 1943 to John J. Grebe, director physical research laboratory, Dow Chemical Co., Midland, Mich. The medal, given annually, is for valuable application of chemical research to industry and will be presented Dr. Grebe at a meeting of the American Section of the Society to be held in New York, N. Y., in November.

Wallace P. Cohoe, of New York, technical adviser to corporations, especially relating to textiles, synthetics, paper, and cellulose, has been elected president of the international Society of Chemical Industries, succeeding Wm. Cullen, of London.

North American Philips Co., Inc., Dobbs Ferry, N. Y., has announced a new trade mark "Norelco", to be applied to products handled by its Industrial Electronics Division at 419 Fourth Ave., New York, N. Y. These products will include electronic temperature indicators, direct reading frequency meters, Searchray (industrial and research X-ray) apparatus, X-ray quartz crystal analysis apparatus, and other electronic applications. The "Norelco" trade mark will also cover cathode ray tubes, transmitter, amplifier and rectifier tubes, quartz oscillator plates, fine wire of all drawable metals: bare, plated and enameled, and Diamond Dies, all of which will continue to be handled direct from the Dobbs Ferry plant. The "Elmet" trade mark will continue to be used in connection with tungsten and molybdenum in powder, rod, wire and sheet form as well as tungsten alloys made by the company in its factory at Lewiston, Me. An associated company, Philips Metalix Corp., Mount Vernon, N. Y., is handling Philips X-ray medical apparatus through its New York office, 419 Fourth Ave. The productive capacity of North American Philips Co., Inc., is still concentrated on war work.

Bibb Mfg. Co., Macon, Ga., at the request of the WPB, according to President Scott Russell, is installing sufficient equipment in Columbus, Ga., to twist approximately 7,500,000 pounds of high-tenacity yarn. The company is not preparing to produce the yarn, but will install equipment so that it can be treated for rubber adhesion. The plant should be in operation about December 1.

Controllers Institute of America, 1 E. 42nd St., New York, N. Y., announces the election to its membership of Charles H. Brook, controller of the Goodyear Tire and Rubber Co., Akron, O. Wilfred L. Larkin, treasurer of Boston Woven Hose and Rubber Co., Cambridge, Mass., has been elected a vice president of the Boston Control of the Institute; while Homer E. Ludwick, controller of the Firestone Tire and Rubber Co. at Los Angeles, Calif., has been made a director of the Los Angeles Control, having completed a term as president of the local organization.

Progress in Rubber Program

The status of the Navy's program for the conservation of rubber and the conversion of crude to synthetic rubber requirements, as outlined in a report of the Office of the Navy Rubber Director detailing progress made since its inception February 2, 1943, was summarized by the Navy Department on July 13 as follows:

(1) *Gas Masks.* The conversion in production of all Navy gas masks from crude to synthetic rubber will be completed by September 1, 1943.

(2) *Wire and Cable.* Such Navy rubber-jacketed cables as still use crude will be converted to synthetic by August 1.

(3) *Mechanical Goods.* Approximately 75% of the Navy's mechanicals requirements will use synthetic rubber by September 1.

(4) *Batteries.* Submarine storage battery jars will use a mixture of half synthetic and half crude rubber by July 15, 1943, and 100% synthetic by September 1.

(5) *Tires and Tubes.* Tires for the Navy's smaller passenger cars, jeeps, and trucks have been wholly converted to synthetic rubber, with highly satisfactory tests. At present some difficulty is being encountered with conversion of larger truck tires, but current tests, both by government and commercial agencies, are encouraging. Tubes of synthetic rubber currently are in production, and tests indicate they also will be satisfactory.

(6) *Rubber Footwear.* In accordance with a program planned jointly by the Navy, Army, Office of the Rubber Director, and the industry, an immediate conversion to 50% synthetic rubber on all Naval rubber footwear production is being effected. By July 15, 1943, test samples of 100% synthetic rubber footwear on a production-run basis will be submitted for testing jointly by the Army and Navy at Camp Lee, Va. Indications are that the Navy's conversion to 100% synthetic rubber footwear production will be effected by September 1.

(7) *Flotation Gear.* It is anticipated that by August 1 all large production items of floating gear, as Army pontoons and Navy rubber boats, will be converted to synthetic rubber. Test samples of the remaining smaller production items, i.e., mooring buoys, life rafts, etc., will be made from synthetic rubber and tested by the Services, in order that this program may be completely converted by October 1. Navy life belts are undergoing immediate conversion to synthetic rubber.

(8) *Clothing.* The Navy has used practically no rubber in protective clothing since last fall. Recent combat experience in the Aleutians, however, has indicated that synthetic rubber, rather than the synthetic resin now used, would be preferable for Navy storm suits; conversion for Navy storm suits has been approved.

It now is estimated that by September 1 the Navy will have converted over 60% of its remaining crude rubber requirements to synthetic rubber.

As part of the Navy's program to educate field personnel in the proper maintenance of tires, approximately 30 service and tire maintenance experts in the rubber industry have been commissioned in the U. S. Naval Reserve and assigned to duty at each Naval District Headquarters and certain larger Naval activities, where, it is anticipated, the experience of these officers will conserve much rubber and lead to the saving of considerable financial expense. Additionally, thus far 140 enlisted men of the Navy Marine Corps and Coast Guard have attended a four-week training school course conducted by two rubber companies in Akron, O. These men have returned to their regular stations, and under the supervision of the tire maintenance officers will conduct further educational programs in the field.

The Navy Rubber Director is Arthur M. Hill, formerly president of the Atlantic Greyhound Corp. and vice president of the Greyhound Corp. Besides maintaining liaison with and reviewing the requests for allocations involving rubber from various Navy Department Bureaus, Mr. Hill's office maintains liaison with the Office of the Rubber Director, WPB, the War Department, the Lend-Lease Administration, and other cognizant government and private agencies.

Charles S. Grainger, of the Australian War Supplies Procurement, Rubber Technical Mission, Washington, D. C., and a director of the Olympic Tyre & Rubber Co., Ltd., Melbourne, states that there is absolutely no truth to the rumor current in the United States that Australia has been obtaining rubber from the nearby rubber growing regions of Malaya and the Dutch East Indies now under Japanese control.

United States Department of Commerce, National Bureau of Standards, Washington, D. C., has released to the manufacturers, distributers, and users of tire repairs "Commercial Standard for Tire Repairs—Vulcanized (Passenger, Truck and Bus Tires), CS 110-43", now a recorded standard of the industry and effective for new production from August 20, 1943.

OHIO

Hycar Chemical Co., manufacturer of oil-resisting butadiene synthetic rubber, 335 S. Main St., Akron, through General Sales Manager Frank M. Andrews has announced the assigning of the Pacific Coast territory to D. C. Maddy, formerly in the Midwest area, who will have headquarters in Los Angeles, Calif. Territorial service representation in the Midwest, covering Ohio, Indiana, Michigan, Illinois, Wisconsin, and Minnesota, now goes to R. E. Bitter, with headquarters in Akron.

The Ohio Rubber Co., Willoughby, has announced that Wm. A. Patterson, formerly assistant professor of mathematics at Fenn College, Cleveland, has joined its organization. At present Dr. Patterson is in the timestudy department to learn the groundwork of the various production departments.

Goodrich Activities

The B. F. Goodrich Co., Akron, through Stanley W. Caywood, general manager of the international sales division, has announced the appointment of Norman G. Keeling, manager of the Goodrich Silvertown Stores in the Akron area since 1939, as manager of the Washington office, replacing Paul Dietz, who resigned to become general export manager of Allis Chalmers Mfg. Co. Mr. Keeling's immediate duties will be the maintenance of contacts with representatives of foreign governments and their purchasing commissions in Washington. After the war he will be assigned to duty in some of those countries.

R. G. Cox, with the Goodrich industrial products organization the last 18 years, is now in charge of molded goods sales, according to W. S. Richardson, general manager of the industrial products sales division. Mr. Cox succeeds E. R. Miller, recently retired.

Government-financed plants for production of 255,000 tons of synthetic rubber annually, or more than a third the output scheduled under the government's entire program will be in operation in Texas within the next 90 days, James J. Newman, Goodrich vice president, told a meeting of business and industrial leaders in Dallas on June 24. These 255,000 tons will be the total output of four plants, all of them polymerization units in which butadiene and styrene produced from Texas petroleum and natural gas will be combined to make butadiene-type synthetic rubber. He listed the plants as follows: A 120,000-ton plant at Port Neches, built by Goodrich, and with 60,000 tons of its capacity to be operated by that company and the other 60,000 by the Firestone Tire & Rubber Co.; a 30,000-ton plant at Baytown, built by the Goodyear Tire & Rubber Co., to be operated by General Tire & Rubber Co. and General Latex & Chemical Co.; a 45,000-ton plant at Borger, built and operated by Goodrich; and a 60,000-ton unit at Houston, built and operated by Goodyear.

As for the general question of the "survival" of America's synthetic rubber industry after the emergency, Mr. Newman said it "seems inevitable that the American people—regardless of price differential between synthetic and natural rubber—will insist on continuing at least stand-by operation of these plants, just as they will make sure of retaining air bases and battleships."

Raymond F. Stratton, manager of the Goodrich display department, celebrated his thirtieth service anniversary with the company in June. During 29 of those years he has been in the advertising department and has been manager of his department for the last 21 years.

Industrial rubber covered rolls made with Ameripol synthetic rubber were announced by Goodrich. These rolls are re-

stricted to war orders with the highest ratings. The company also announced that it is prepared to furnish rolls covered with another type of synthetic rubber for those orders which cannot qualify for Ameripol. These rolls are made in a complete range of hardness, from 80 durometer to a very soft compound.

Goodrich has announced an airplane tire designed to reduce landing hazards caused by high landing speeds on difficult terrain and to save weight for military planes by substituting nylon cord for the customary cotton or rayon construction. The company has developed ways of using nylon to build an extra-strength tire and use fewer plies of rubberized cord than usual. Studies on the use of nylon cord for passenger-car, truck, and bus tires are being pushed, but data on these tests are still incomplete.

Goodrich has installed a new "live steam barge vulcanizer" said to be the largest in use in Akron. It has an inside diameter of 10 feet 6 inches, is 42 feet long, and weighs 35 tons; its "bank vault" door alone weighs 10 tons. This vulcanizer has stepped up the vulcanization speed on inflatable rubber barges for tending U. S. Navy patrol planes from the rate of one every three hours to one every 50 minutes. During the live-steam treatment the interior temperature of the vulcanizer is raised to 275° and held there under pressure to give the rubber and fabric barges a 20-minute cure. The barges are swung into curing position on an overhead monorail with an exterior switching arrangement that permits vulcanization on a "moving belt" production line basis. The barges, equipped with steel mountings for outboard motors, are 25 feet long and 7½ feet wide and can be deflated and rolled into small storage space when not in use.

Lieut. Donald W. Feury, before the war a general foreman in the Cadillac, Mich., plant of the Goodrich company, was killed in action in New Guinea while leading his men against the Japanese. When news of his death was received by his former fellow workers in Cadillac, some one suggested that a special set of aircraft de-icers be made and dedicated to him. Each de-icer part was labeled with red, white, and blue stickers so that the complete set would be installed on the same bomber. Learning of this memorial, Ford Motor Co. arranged schedules at its Willow Run bomber plant; so the complete set was placed on the same four-engined Liberator then bound for action against the enemy.

General Tire & Rubber Co., Akron, on July 15 made Charles E. Bittaker, former superintendent of the tire room, production superintendent, according to Charles J. Jahant, vice president in charge of production. Mr. Bittaker, a native of Akron, received his promotion from the same man who hired him 29 years before —Mr. Jahant. On May 14, 1942, Mr. Bittaker had the unusual distinction of celebrating his fiftieth birthday and his twenty-fifth anniversary with General Tire. He had worked for Mr. Jahant previously at another rubber company. Educated in the Akron public schools, Mr. Bittaker joined The B. F. Goodrich Co. in its

Charles E. Bittaker

chemical laboratory in 1906 and then worked for the Diamond Rubber Co. and the Firestone Tire & Rubber Co. before going to General. He is married and has two children, a daughter and a son, Charles Bittaker, Jr., employed in General's chemical laboratory.

Goodyear in Peru

Less than a year from the time construction started, The Goodyear Tire & Rubber Co.'s third tire plant in South America started production in Peru, on July 23. Located on Avenida Republica Argentina between Callao and Lima, Peru's first tire plant occupies a large tract of land acquired especially by Goodyear for the purpose.

After ceremonies in which Manual Prado Ugarteche, president of Peru, participated, the first tire to be turned out in the plant was given to the republic's national museum. Others participating in the ceremonies included P. W. Litchfield, chairman of Goodyear's board of directors; Z. C. Oseland, treasurer; and George K. Hinshaw, production manager of Goodyear Foreign Operations, Inc.

After officially opening the Peru plant, Mr. Litchfield reviewed and praised the nation's progress in development of transportation facilities. He promised that all of Goodyear's experience, skill, and resources will be utilized fully in producing Peruvian made Goodyear tires and tubes.

Goodyear officials announced that Peruvian rubber will be used exclusively in the Lima plant, furnishing employment for scores of Peruvian citizens and assuring the nation of a supply of tires and tubes made in their own country for essential driving.

Goodyear's first South American factory was established in Hurlingham, Argentina, in 1931, followed by another at Sao Paulo, Brazil, which started operations in 1939. The Lima tire plant, on which construction was started in September, 1942, is Goodyear's twelfth in various parts of the world.

The Firestone Tire & Rubber Co., Akron, has developed a new tool for loosening airplane tire beads from the rims. Heretofore caterpillar tractors and half-tracks frequently had been rolled across the tires to break them from the rims, but now a woman using the new tool can do the job in a few minutes without any assistance. The new bead loosener was designed by W. H. McCollister, a member of the Firestone development department and a veteran of 22 years of service.

NEW ENGLAND

Builds Battery Carbon Plant

Godfrey L. Cabot, Inc., 77 Franklin St., Boston, Mass., has announced completion of a million-pound dry-cell carbon plant at Pampa, Tex., for the manufacture of Cabot Battery Carbon. This new product will help relieve the shortage of a critical material for the dry-cell battery industry and was developed by Cabot's research department working in conjunction with dry-cell manufacturers throughout the United States and with the Fort Monmouth Signal Laboratory of the United States Army Signal Corps. American dry battery manufacturers have heretofore been dependent on sources of supply outside the United States, and the erection of new Cabot Battery Carbon plants will be a valuable addition to the national war effort.

An application has been filed with the War Production Board for permission to build a second plant of two million pounds' additional capacity at the earliest possible moment.

The Cabot firm added to its research division George Goldfinger, formerly associated with Prof. H. Mark's laboratory at the Polytechnic Institute of Brooklyn, N. Y., where he was engaged in work on high polymers.

Converse Rubber Co., Malden, Mass., on June 30 was given a plaque "in recognition for outstanding achievement in the war effort" by the City of Malden. Presentation was made by Alderman J. J. Lucey, and receiving the award on behalf of the Converse company were President Henry C. Berlin, Treasurer Stephen A. Stone, Factory Manager Edward F. Casey, and Assistant Factory Manager Jeremiah J. O'Neil.

Ernest I. Kilcup, president, Davol Rubber Co., Providence, R. I., on June 30 was honored by an ovation from company employes, marking his membership into the Davol Quarter Century Club. Mr. Kilcup received a specially prepared, illuminated scroll welcoming him into the Club, the Club emblem, a gold cigarette case, and a leather-bound testimonial book containing signatures of all Davol employes, all of whom had contributed to the gift. Vice President Ralph D. Berry presided.

Kleistone Rubber Co., Inc., Warren, R. I., to take care of increased business due to the war, has acquired extra space in a building on Main St., to be used as a branch workshop, according to Superintendent John W. Higgins. Between 40 and 50 workers, mostly women, will be used in the new addition.

Bristol Mfg. Co., Bristol, R. I., on July 21 held dedicatory exercises for a plaque honoring 109 workers now in the service. Among those participating in the affair were President Maurice C. Smith, General Superintendent George D. Felix, and Industrial Relations Manager Anthony J. Nunes.

Rhode Island rubber manufacturers in June paid out $379,841 in wages, 4.1% below the May figure, but 26.4% above wages in June, 1942.

MIDWEST

Robert S. McFadden, formerly rubber chemist in the research division of Industrial Tape Corp., subsidiary of Johnson & Johnson, New Brunswick, N. J., recently joined the research organization of Eagle-Picher Lead Co., at Joplin, Mo., in charge of rubber and synthetic rubber research.

The Detroit Gasket & Mfg. Co., Detroit, Mich., has originated a copper mesh coated with synthetic rubber for gasket use. This mesh, less than $^{15}/_{1000}$-inch thick, is being supplied by the Goodyear Tire & Rubber Co., Akron, O., to the Detroit company, which in turn supplies complete gaskets of the new material to airplane engine manufacturers. Advantages claimed for this improved product include: high tensile strength, flexibility, resiliency, oil resistance, dimensional stability, and accuracy.

General Motors Corp., Detroit, Mich., starting August 1, is sponsoring the NBC Symphony Orchestra's Sunday broadcasts on the full NBC network for one year.

CANADA

C. D. Howe, Munitions Minister at Ottawa, Ont., recently told the press that Canadian distilleries since November 1 have been concentrating entirely on the production of industrial alcohol and are building up so great a surplus that obtaining sufficient airtight tanks to contain it has become a problem. He mentioned the plant being built to produce rubber, which, he intimated, will require great quantities of alcohol and which has not come along so fast as expected.

Mr. Howe, on June 16, in testimony before the House of Commons, Ottawa, relating to his departmental war appropriations, stated that all the rubber Canada needs for war and all that it is likely to need afterwards will be made at the government-owned synthetic rubber plant at Sarnia, Ont., which probably will be in full operation by November producing 34,000 tons of Buna S, suitable for tires, and 8,000 tons of Butyl rubber, suitable for other industrial uses. He further believes that the Canadian Government will continue the plant even after the war. The plant producing styrene for the government project should be in operation this month, but the butadiene plant, held up by difficulty in securing equipment, will not start operations before September or October, according to Mr. Howe. He also declared that in choosing petroleum as a base instead of alcohol from grain, the Dominion followed the United States in adopting the cheapest and quickest method. Besides all the existing alcohol plants in Canada would not produce one-third of the alcohol needed for the rubber program. The government's investment in the synthetic rubber plant runs between 40 and 45 million dollars, and no further expansion is planned; but, said Minister Howe, if any private industry wished to carry on, the government would not object. Canada in peacetime uses about 30,000 tons of rubber a year.

Polymer Corp.'s plant at Sarnia, Ont., started first operations June 30 when crude styrene was manufactured by the Dow Chemical Co. of Canada, Ltd. Within a few weeks a distillation unit should be finished, after which the processing of the styrene will be complete. Officials of the Dow Chemical Co., Midland, Mich., U. S. A., were present in Sarnia to watch the initial run of styrene. The St. Clair Processing Co., Ltd., will make butadiene when its portion of the plant is completed and this will be combined with the styrene to make buna rubber, which will be released by the Canadian Synthetic Rubber Co., Ltd., to manufacturers in Canada.

Trade Minister MacKinnon, at Ottawa, Ont., announced an amendment to Canadian export regulations regarding Newfoundland. Effective July 1, only shipments of $25 or less in value will be exempt from requiring an export permit to Newfoundland. Permits are still required to any destination for shipments of any value, including rubber and rubber products.

Order Rubber 6-b, June 14, amends order Rubber 6-A respecting maximum prices for neoprene.

FINANCIAL

Belden Mfg. Co., Chicago, Ill. First quarter, 1943: net income, $140,000, or 51¢ a share, against $133,000, or 44¢ a share, in the first quarter of 1942; net sales, $2,715,000, against $2,273,000; tax reserves, $325,000, against $314,000.

Collyer Insulated Wire Co., Pawtucket, R. I. For 1942: net income, $1,-616,997, against $252,832 in 1941; net sales, $18,994,856, against $10,497,917; federal income and excess profits taxes, $4,991,117, against $350,320.

Dominion Textile Co., Ltd., Montreal, P. Q. Canada. Year ended March 31, 1943: net profit, $1,636,885, equal to $5.56 a common share, against $1,546,624, or $5.22 a share, in the previous 12 months; reserve for income and excess profits taxes, $7,770,000, against $8,000,000.

Lee Rubber & Tire Corp., Conshohocken, Pa., and subsidiary. Six months to April 30: net profit, $602,585, equal to $2.50 a share, against $598,364, or $2.48 a share, in the same period last year; net sales, $11,528,928, against $7,967,972; income and excess profits taxes, $1,112,585, against $323,703.

(Continued on page 507)

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Wringer Co., Inc.	Com.	$0.15 resumed	July 1	June 15
Anaconda Wire & Cable Co.	Com.	0.25	July 19	July 9
Baldwin Rubber Co.	Com.	0.12½ q.	July 21	July 15
Collyer Insulated Wire Co.	Com.	0.50	July 1	June 24
Crown Cork & Seal Co., Ltd.	Com.	0.50 q.	Aug. 16	July 15
Dayton Rubber Mfg. Co.	Com.	0.25	Aug. 2	July 17
Dayton Rubber Mfg. Co.	Class A Pfd.	0.50	Aug. 2	July 17
Detroit Gasket & Mfg. Co.	Com.	0.25	July 26	July 10
DeVilbiss Co.	7% Pfd.	0.17½ q.	July 15	June 28
Firestone Tire & Rubber Co.	Cum. Pfd. A	1.50 q.	Sept. 1	Aug. 14
General Cable Corp.	Pfd.	1.75 accum.	Aug. 2	July 16
Goodyear Tire & Rubber Co., Inc.	Com.	0.50	Sept. 15	Aug. 14
Goodyear Tire & Rubber Co., Inc.	$5 Cum. Conv. Pfd.	1.25 q.	Sept. 15	Aug. 14
Hercules Powder Co.	6% Pfd.	1.50 q.	Aug. 14	Aug. 3
Jenkins Bros.	Founders' Shares	1.00	June 29	June 18
Jenkins Bros.	Non Voting	0.25	June 29	June 18
Jenkins Bros.	7% Pfd.	1.75 q.	June 29	June 18
Lee Rubber & Tire Corp.	Com.	0.75	Aug. 2	July 15
Midwest Rubber Reclaiming Co.	Com.	0.50 q.	Aug. 1	July 20
Norwalk Tire & Rubber Co.	Pfd.	0.87½ q.	Sept. 30	Sept. 15
Norwalk Tire & Rubber Co.	Com.	0.20	Sept. 15	Aug. 25
Phelps Dodge Copper Corp.	Com.	0.40	Sept. 10	Aug. 17
Philadelphia Insulated Wire Co.	Com.	0.50 s.	Aug. 16	Aug. 2
Tyer Rubber Co.	6% Pfd.	1.50 q.	Aug. 16	Aug. 10
United States Rubber Co.	Com.	0.25	Sept. 24	Sept. 10
United States Rubber Co.	8% Pfd.	2.00	Sept. 24	Sept. 10
U. S. Rubber Reclaiming Co., Inc.	Pfd.	0.50 accum.	July 7	June 29

Rubber Reserve Co. Circular No. 22

Sale of Crude Rubber, Guayule, Liquid Latex and Synthetic Rubber to Manufacturers for Use in the Manufacture of End-Products in Connection with "War Orders" (as Defined in War Production Board Supplementary Order M-15-b, as Amended)

Supplementing Circular No. 21, Dated May 31, 1943

1. Paragraph 2 of Circular No. 21[1] states parenthetically that "No price has been established for the sale of GR-M for 'Civilian Use.'" Rubber Reserve Co. has now determined that it will sell GR-M (neoprene) at a price of 27½¢ per pound for "Civilian Use" (plus the uniform freight charge referred to in Circular No. 17[2]). Morever, Rubber Reserve Co. has determined that, although no change will be made in the price of 45¢ per pound (as set forth in Exhibit "A" attached to Circular No. 17), with respect to sales of GR-M for "Other than Civilian Use", in view of the problems involved in the adjustment of "War Orders" to reflect such price, the special procedure outlined in Paragraph 3 of Circular No. 21 shall apply to the payment of such price with respect to sales of GR-M for use in the manufacture of end-products covered by "War Orders" (as defined in War Production Board Supplementary Order M-15-b, as amended), said determination having been made after consultation with the War Department, Navy Department, Procurement Division of the Treasury Department, and the United States Maritime Commission.

2. Accordingly, effective with purchase permits issued on and after July 10, 1943, Rubber Reserve Co. shall accept payment from manufacturers at the above-mentioned rate of 27½¢ per pound (plus the uniform freight charge referred to in said Circular No. 17) for all sales of GR-M, whether for "Civilian Use" or "Other than Civilian Use." With respect to GR-M used after July 31, 1943, for "War Orders" (as shown by certificate submitted in pursuance of the provisions of sub-paragraph (C) of said Paragraph 3 of Circular No. 21), the War Department, Navy Department, Procurement Division of the Treasury Department, and the United States Maritime Commission shall make a payment direct to Rubber Reserve Co. in the amount of 17½¢ per pound. The certificates required by said sub-paragraph (C) to be submitted to Rubber Reserve Co. monthly by each manufacturer shall reflect the amount of GR-M used in producing under "War Orders" end-products for which the manufacturer rendered invoices during the month for which the certificate is made, subject to all of the other provisions of said sub-paragraph (C) as well as sub-paragraphs (D), (E) and (F), and the term "synthetic rubber" as used in said certificates and in said subparagraphs shall be deemed to include GR-M.

3. Manufacturers which have purchased on or after July 1, 1943, GR-M at a price of 45¢ per pound (which is the price set forth in Exhibit "A" of Circular No. 17 under the column designated "Other than Civilian Use") should forward to the Treasurer of Rubber Reserve Co. a debit memorandum against Rubber Reserve Co. in an amount equal to the difference between the price actually paid on the basis of 45¢ per pound, and the price of 27½¢ per pound set forth in Paragraph 1 hereof. All such debit memoranda shall schedule by purchase permit number the deliveries and amounts of the purchases in connection with which such refund is requested. A check will be mailed to the manufacturer covering the refund requested in the debit memorandum if the amount is found to be correct.

4. There are attached hereto revised forms of certificates designated as Exhibits "A", "B", "C", "D", and "E" which should be used by manufacturers, in lieu of the forms which were attached to Circular No. 21, in reporting the amount of natural rubber and synthetic rubber actually used in producing "War Order" end-products. The revised form provides for a breakdown by types of the amount of synthetic rubber so used. Exhibit "A" has been further revised to reflect an additional classification to cover all War Department contracts and subcontracts which are not covered by the contract symbols listed on such certificate. Although sub-paragraph (C) of Paragraph 3, Circular No. 21, states that the required certificates should be forwarded to Rubber Reserve Co. not later than the 20th day of the month, manufacturers will be permitted to forward such certificates not later than the 30th day of each month. Certificates covering the month of June should be submitted in the revised forms attached hereto.

5. In cases where manufacturers, for experimental purposes, desire to purchase general-purpose synthetic latices in quantities not in excess of ten gallons, and/or any general-purpose synthetic rubber in quantities not in excess of 100 pounds, requests therefor should be forwarded direct to the Sales Department, Rubber Reserve Co., 811 Vermont Ave., N. W., Washington, D. C., rather than to the Office of the Rubber Director. The foregoing relates only to synthetic latices and general-purpose synthetic rubber produced in government-owned plants.

6. If, upon the receipt of a shipment of synthetic rubber, the purchaser desires to file a complaint, the following information should be immediately transmitted by telephone or telegram to the Synthetic Rubber Production Department, Rubber Reserve Co., Washington, D. C.: (1) Supplier; (2) Type of Synthetic Rubber; (3) Quantity; (4) Code Number; (5) Car Number or Trucking Company; (6) Date Received; (7) Detail of Complaint. No disposition of any material is to be made without official direction from Rubber Reserve Co.

7. All reference made in this Circular and the exhibits attached hereto to "War Orders" as defined in War Production Board Supplementary Order M-15-b, as amended, shall henceforth be deemed to refer to "Government Orders" as defined in War Production Board Order R-1, dated June 18, 1943 (which superseded said War Production Board Supplementary Order M-15-b, as amended).

8. War Production Board Order R-1 establishes neoprene as a general-purpose synthetic rubber. Manufacturers are, therefore, advised that GR-M is now available in quantity for use in the manufacture of permitted end-products.

9. The attention of manufacturers is called to the fact that the revised form "Request for Purchase of General Purpose Rubber" which was circulated on June 15, 1943, by the Office of Rubber Director, does not require notarization as was the case in connection with the form previously used.

10. This Circular has been approved by the Office of the Rubber Director.

July 6, 1943.

[1] INDIA RUBBER WORLD, July, 1943, pp. 384-85.
[2] *Ibid.*, May, 1943, pp. 169-73.

EXHIBIT "A" (REVISED)

....
....

Treasurer,
Rubber Reserve Co.,
811 Vermont Ave., N. W.,
Washington, D. C.

Dear Sir:

The undersigned hereby certifies that the amount of natural rubber* and synthetic rubber listed below was actually used in producing, under contracts with the War Department and sub-contracts* thereunder, end-products invoiced during the month of ...., 194...

Service	Contract Symbol	Natural Rubber (Pounds)	Synthetic Rubber (Pounds) GR-S	GR-M	GR-I
Quartermaster	W—qm—	......	....	....	....
Signal Corps	W—sc—	......	....	....	....
Engineers C'ps	W—eng—	......	....	....	....
Chem. Warfare	W—cws—	......	....	....	....
Transportation	W—tc—	......	....	....	....
Ordnance	W—ord—	......	....	....	....
Air Forces	W—ac—	......	....	....	....
Medical Corps	W—med—	......	....	....	....
ALL OTHER CONTRACTS AND SUBCONTRACTS PREFACED BY THE LETTER "W" NOT COVERED BY THE CONTRACT SYMBOLS LISTED ABOVE		......	....	....	....
Totals		......	....	....	....

* The term "natural rubber" shall include guayule and liquid latex (total dry latex solids). The term "sub-contract" means any contract or purchase order of the type defined in sub-paragraph (iii) of War Production Board Supplementary Order M-15-b as amended.

....
(Name of Manufacturer)

....
(Authorized Signature)

....
(Title)

Subscribed and sworn to before me this .... day of .... 194...

....
(Notary Public)

EXHIBIT "B" (REVISED)

....
....

Treasurer,
Rubber Reserve Co.,
811 Vermont Ave., N. W.,
Washington, D. C.

Dear Sir:

The undersigned hereby certifies that the amount of natural rubber* and synthetic rubber listed below was actually used in producing, under contracts with the Navy Department and sub-contracts* thereunder, end-products invoiced during the month of .... 194...

Bureau	Contract Symbol	Natural Rubber (Pounds)	Synthetic Rubber (Pounds) GR-S	GR-M	GR-I
Supplies & Accounts	Nxs,NOs	......	....	....	....
Ordnance	NOrd	......	....	....	....
Ships	NObs	......	....	....	....
Aeronautics	NOa	......	....	....	....
Yards & Docks	NOy	......	....	....	....
Marine Corps	NOm	......	....	....	....
Coast Guard	TCg	......	....	....	....
General and Departmental Field Activities	**	......	....	....	....
Totals		......	....	....	....

** XOd and all symbols beginning with the letter "X" not listed above.

* The term "natural rubber" shall include guayule and liquid latex (total dry latex solids). The term "sub-contract" means any contract or purchase order of the type defined in sub-paragraph (iii) of War Production Board Supplementary Order M-15-b as amended.

....
(Name of Manufacturer)

....
(Authorized Signature)

....
(Title)

Subscribed and sworn to before me this .... day of ...., 194...

....
(Notary Public)

EXHIBIT "C" (REVISED)

....
....

Treasurer,
Rubber Reserve Co.,
811 Vermont Ave., N. W.,
Washington, D. C.

Dear Sir:

The undersigned hereby certifies that the amount of natural rubber* and synthetic rubber listed below was actually used in producing under Lend-Lease Contracts with the Procurement Division of the Treasury Department and sub-contracts* thereunder, end-products invoiced during the month of ...., 194...

	Natural Rubber (Pounds)	Synthetic Rubber (Pounds)		
		GR-S	GR-M	GR-I
Lend-Lease Contracts (Symbol DA-TPS)	.....	.....	.....	.....

*The term "natural rubber" shall include guayule and liquid latex (total dry latex solids). The term "sub-contract" means any contract or purchase order of the type defined in sub-paragraph (iii) of War Production Board Supplementary Order M-15-b as amended.

....
(Name of Manufacturer)

....
(Authorized Signature)

....
(Title)

Subscribed and sworn to before me this .... day of ...., 194...

....
(Notary Public)

EXHIBIT "D" (REVISED)

....
....

Treasurer,
Rubber Reserve Co.,
811 Vermont Ave., N. W.,
Washington, D. C.

Dear Sir:

The undersigned hereby certifies that the amount of natural rubber* and synthetic rubber listed below was actually used in producing, under contracts with the United States Maritime Commission and sub-contracts* thereunder, end-products invoiced during the month of......... 194....

	Natural Rubber (Pounds)	Synthetic Rubber (Pounds)		
		GR-S	GR-M	GR-I
Lend-Lease Contracts (Symbol DA-MCC)	.....	.....	.....	.....
All Others	.....	.....	.....	.....
Totals	.....	.....	.....	.....

*The term "natural rubber" shall include guayule and liquid latex (total dry latex solids). The term "sub-contract" means any contract or purchase order of the type defined in sub-paragraph (iii) of War Production Board Supplementary Order M-15-b as amended.

....
(Name of Manufacturer)

....
(Authorized Signature)

....
(Title)

Subscribed and sworn to before me this .... day of ...., 194...
(Notary Public)

....

EXHIBIT "E" (REVISED)
SUMMARY

....
....

Treasurer,
Rubber Reserve Co.,
811 Vermont Ave., N. W.,
Washington, D. C.

Dear Sir:

The undersigned hereby certifies that the amount of natural rubber* and synthetic rubber listed below was actually used in producing, under contracts with Procurement Agencies of the Federal Goveernment and sub-contracts* thereunder, end-products invoiced during the month of.................... 194....

	Natural Rubber (Pounds)	Synthetic Rubber (Pounds)		
		GR-S	GR-M	GR-I
War Department	.....	.....	.....	.....
Navy Department	.....	.....	.....	.....
Procurement Division of the Treasury Department	.....	.....	.....	.....
Maritime Commission	.....	.....	.....	.....
ALL OTHER PROCUREMENT AGENCIES	.....	.....	.....	.....
Totals	.....	.....	.....	.....

*The term "natural rubber" shall include guayule and liquid latex (total dry latex solids). The term "sub-contract" means any contract or purchase order of the type defined in sub-paragraph (iii) of War Production Board Supplementary Order M-15-b as amended.

....
(Name of Manufacturer)

....
(Authorized Signature)

....
(Title)

Subscribed and sworn to before me this .... day of ...., 194...

....
(Notary Public)

A Suggested Vulcanizing Combination for GR-I

MEMORANDUM

To: Consumers of Synthetic Rubber
From: H. E. Simmons
Office of the Rubber Director
Subject: A Suggested Vulcanizing Combination for GR-I

As GR-I rubber (Butyl) comes more and more into production, the question of proper acceleration becomes more acute. We are enclosing a release which you may find helpful in your experimental work with this particular synthetic.

A Suggested Vulcanizing Combination for GR-I

The following base compound was developed in the laboratory of the Acushnet Process Co. by P. T. Gidley. Application for patent is being made by Acushnet, but P. E. Young, president of that company, has kindly agreed to make this disclosure available for the duration. The formula is herewith passed on to the entire rubber industry as a matter of general information.

BASE COMPOUND

GR-I	100
Stearic acid	1
Paraffin	1
Zinc oxide	5
Sulphur	1.5
Thiurad, Methyl Tuads, Thiuram M, or Tuex	1
Selenac	1.5
Red lead	0.5
	111.5

Laboratory press cure: 7-12 Min. at 340-320° F.

Paraffin is added primarily to improve the release of butyl compounds from molds. The use of a mold lubricant with Butyl rubber is undesirable for the reason that such materials not infrequently cause blistering and/or flow cracking.

The two organic accelerators used together as specified give a faster cure and better tensile properties than when either one is used alone in any proportion. The advantages of this vulcanizing combination are stated to be:

1. The plasticizing effect of the Selenac with zinc oxide in milling.
2. Freedom from scorching.
3. Ease of dispersion.
4. Storage stability of the uncured stock.
5. Freedom from stiffening during natural or accelerated aging.
6. Good tear resistance.

The addition of the red lead is stated to increase the modulus substantially and also to shorten the time of cure.

Any desired filler may be added to this base compound. Carbon blacks are preferred for highest quality.

July 9, 1943.

Uniform Carbon Black Nomenclature

AT A meeting of the Research Compounding Branch's Advisory Committee of the Office of the Rubber Director, N. A. Shepard appointed a committee consisting of representatives of the principal carbon black manufacturers to work out a uniform system of nomenclature which would cover all of the important classes of black. The committee has reported through its chairman, W. B. Wiegand the nomenclature given below, which also includes brand names by producers. Its use by rubber chemists and technologists should be of considerable value in eliminating the confusion that has existed because of the inaccurate and inadequate terminology that has been in use in the last year or so on the many new carbon blacks that have been announced.

CARBON BLACK NOMENCLATURE — BRAND NAMES BY PRODUCERS — JUNE 14, 1943

	Symbol	Cabot	Columbian	Continental	Huber	Johnson	United	Witco
Conductive Channel	CC	....	....	....Under Classification....	....	....	....	....
Hard Processing Channel	HPC	Spheron #4	Micronex Mx II	Continental F	HX	....	Kosmobile S	....
Medium Processing Channel	MPC	Spheron #6	Std. Micronex	Continental A	TX	....	Kosmobile	....
Easy Processing Channel	EPC	Spheron #9	Micronex W-6	Continental AA	Wyex	....	Kosmobile 77	....
		Cabot	Columbian	General Atlas	Huber	Phillips	United	
Conductive Furnace	CF	....	Statex A	....	FB200	....	(*)	
Fine Furnace	FF	....	Statex B	....	......	....	..........:	
High Modulus Furnace	HMF	....	Statex 93	....	......	Philback	Kosmos 40	
Semi-Reenforcing Furnace	SRF	Sterling	Furnex	Gastex	Essex	....	Kosmos 20	
		Shell	Thermatomic					
Fine Thermal	FT	....	P-33					
Medium Thermal	MT	Shell	Thermax					

(*) To be announced later.

EUROPE

RUSSIA

Kok-Saghyz Tires

Experiments in making tires of synthetic and home-grown rubber were carried out by the Russians at a very early stage of the development of these rubbers, and tires of these new materials figured among the 147 tires used in a large-scale test organized in 1933.[1] A caravan of automobiles left in July, 1933, on a round-trip which started from Moscow and proceeded to Kara Kum, in Turkestan, and returned to Moscow again by a different route, arriving in December of the same year. The distance covered was about 9300 kilometers (5766 miles), and the road conditions over a great part of the journey were of the worst. Of the 147 tires used, 94 were of synthetic rubber, 23 of natural imported rubber, and 10 of 100% *tau-saghyz* rubber. In the report on the results of the tires, it was stated that the performance of the *tau-saghyz* tires compared very well with that of the other tires; the abrasion resistance calculated on the loss of weight in grams for every 1000 kilometers (621 miles) run was lower than that of the synthetic rubber tires, but somewhat higher than of the imported plantation rubber tires; two of the *tau-saghyz* tires succumbed to the road conditions, but only one of the tires showed signs of incipient separation of the plies in the carcass.

Very little, if any, further mention has been found in the literature of the subsequent use of *tau-saghyz* for tires, probably because the difficulties attending the cultivation of *tau-saghyz* rubber caused attention to be turned to the exploitation of the *kok-saghyz* plant.

The Krasnaya Treugolnik seems to have been the first to undertake large-scale experiments in the use of *kok-saghyz* rubber for various purposes, including tires, and late in 1939 published details about the manufacture of *kok-saghyz* tires and about the mechanical properties of the compounds used for the various parts of the tire. The basic material was the so-called alkali *kok-saghyz*, which first underwent purification in a washing mill and then had a certain proportion of aldol-alpha-naphthylamine added (AgeRite Resin), before compounding commenced. The chemical analysis of the rubber gave the following results:

	%
Moisture (according to Marcusson)	0.50
Ash	2.57
Acetone extract	8.30
Chloroform extract	82.96
Insoluble in acetone and chloroform	5.76

The usual formulae used for making tires of natural imported rubber were employed, with, of course, necessary modifications dictated by certain specific properties of *kok-saghyz*. Thus besides stearic acid, aldol-alpha-naphthylamine was added to all compounds [the aldol-alpha-naphthylamine replaced phenyl beta naphthylamine (neozone D,) since the latter blooms in finished *kok-saghyz* goods, thus detracting from their appearance], to protect the rubber from aging.

All compounds, whether prepared in the laboratory or in the factory, had a very flat curing range and adequate tensile strength; they did not scorch when boiled in water 30-40 minutes, but their plasticity was considerably higher than that of mixes of natural imported rubber plasticized for 40 minutes.

For the test, tires 7.50 by 17 were produced. The operations of incorporating ingredients in the *kok-saghyz* rubber, working the mix on mill and calender, and coating the cord, took place at the usual factory temperatures, and no special difficulties were encountered.

Treads and sidewalls were made of the same tread-compound: black walls had to be used since a laboratory test showed that white walls of *kok-saghyz* rubber turned yellow after exposure to sunlight for four days. The physico-mechanical values obtained

[1] India Rubber World, Apr., 1942, pp. 76-79.

for tread and sidewall rubber are shown in Table 1; Table 2 gives control data.

TABLE 1. TREAD AND SIDE WALL COMPOUND

Prepared in	Laboratory				Factory			
Curing time in minutes at 2.8 atmospheres (41 psi)	30	45	60	90	30	45	60	90
Tensile strength, kg/cm²	193	197	197	195	229	234	228	218
psi	2740	2800	2800	2770	3250	3320	3240	3090
Relative elongation in %	620	560	570	570	674	636	612	600
Permanent elongation in %	33	31	31	29	36	36	33	30

TABLE 2. CONTROL DATA—TREAD COMPOUND

Plasticity	0.46
Recovery	0.94
Softness	0.49
Shore hardness	30
Ring modulus	5.5
Specific gravity	1.185

For the cord breaker strips, one side of the cord was coated with breaker compound; while the other side was first frictioned with spreader compound on which was superimposed a layer of breaker rubber. Tables 3 and 4 give the physical and mechanical data of the breaker compound.

TABLE 3. BREAKER COMPOUND

Prepared in	Laboratory					Factory				
Curing time in minutes at 2 atmospheres (29 psi)	15	30	45	60	90	15	30	45	60	90
Tensile strength, kg/cm²	199	228	216	218	218	152	169	189	176	167
psi	2830	3240	3070	3100	3100	2160	2400	2690	2500	2380
Relative elongation in %	830	850	850	810	850	773	752	800	776	804
Permanent elongation in %	20	21	20	21	20	16	16	20	20	20

TABLE 4. CONTROL DATA—BREAKER COMPOUND

Plasticity	0.62
Softness	0.64
Recovery	0.97
Shore hardness	40
Ring modulus	4.0
Specific gravity	1.135

The cord plies were skim coated on one side and friction coated on the other; the latter coating was applied on the spreading machine. The physical and mechanical values of the two types of rubber and the control data are given in Tables 5, 6 and 7.

TABLE 5. SKIM-COAT COMPOUND

Prepared in	Laboratory					Factory				
Curing time in minutes at 2 atmospheres (29 psi)	15	30	45	60	90	15	30	45	60	90
Tensile strength, kg/cm²	228	220	198	192	194	186	183	171	160	148
psi	3240	5130	2820	3720	2760	2630	2600	2430	2280	3100
Relative elongation in %	740	740	750	740	740	790	824	874	868	856
Permanent elongation in %	20	22	19	18	15	16	16	16	16	16

TABLE 6. FRICTION COAT COMPOUND

Prepared in	Laboratory					Factory				
Curing time in minutes at 2 atmospheres (29 psi)	15	30	45	60	90	15	30	45	60	90
Tensile strength, kg/cm²	151	190	195	186	190	133	173	183	182	175
psi	2150	2710	2780	2650	2700	1890	2460	2610	2590	2490
Relative elongation in %	830	830	840	820	880	870	814	841	832	834
Permanent elongation in %	16	20	17	16	16	14	15	19	20	19

TABLE 7. CONTROL DATA

	Skim Coat	Spreader Rubber
Plasticity	0.57	0.60
Recovery	0.93	0.93
Softness	0.63	0.64
Shore hardness	40	35
Ring modulus	4.75	5.25
Specific gravity	1.085	1.055

The fabric for chafers and flippers was frictioned with the same compound used for spreading on the cords and the breaker cord; while the strips for the edges of chafers and flippers were of the skim-coat rubber.

The tires were built on mechanized mandrel lathes (Banner). Assembly was entirely satisfactory as the *kok-saghyz* rubbers were not inferior to smoked sheet in regard to adhesion properties. Vulcanization of the tires was carried out in autoclaves, and their physical mechanical properties are indicated in Table 8.

TABLE 8. DATA ON FINISHED TIRES

Tread		Strength of Union	Kg/Cm²	PSI
Tensile strength, kg/cm² (3140 psi)	220	Between tread and breaker	8.5	1210
Relative elongation, %	585	Between breaker and carcass	10.2	1450
Permanent elongation, %	33	Between plies 2 and 3 of carcass	6.2	883
Abrasion resistance cc/hp-hr	358	Between plies 3 and 4 of carcass	7.4	1052
Shore hardness	60	Between plies 4 and 5 of carcass	7.4	1052
Specific gravity	1.20	Between plies 5 and 6 of carcass	6.2	883

Inner Tubes of *Kok-Saghyz*

Inner tubes also were made of *kok-saghyz* rubber, and in the main the usual formula for imported natural rubber could be employed here too although the amount of antioxidant, stearic acid, and pigments had to be adjusted. As in the case of the tire compounds, the inner tube rubber was far more plastic than that made of smoked sheet, a circumstance that rendered the removal of the tubes from the cores rather difficult.

The tubes underwent two cures—the first for 20 minutes at 3.5 atmospheres (51.5 psi), and the second after the ends were cemented together, for 20 minutes also at 3.5 atmospheres. For the first cure the tubes had to be wrapped with bandages over the entire surface to prevent porosity and rough surfaces, defects peculiar to *kok-saghyz* vulcanized in open steam.

The physico-mechanical properties of the inner tube rubber, and control data are given in Tables 9 and 10; data on the properties of the finished article are given in Table 11.

TABLE 9. INNER TUBE COMPOUND

Prepared in	Laboratory					Factory				
Curing time in minutes at 3 atmospheres (44 psi)	15	20	25	30	45	15	20	25	30	45
Tensile strength, kg/cm²	168	163	158	148	147	164	177	167	169	168
psi	2410	2340	2270	2130	2110	2360	2540	2400	2430	2410
Relative elongation, in %	700	710	710	720	750	800	810	780	750	840
Permanent elongation in %	22	23	24	23	23	28	28	28	25	26

TABLE 10. CONTROL DATA INNER TUBE COMPOUND

Plasticity	0.60
Recovery	0.97
Softness	0.62
Shore hardness	40
Ring modulus	4.5
Specific gravity	1.205

TABLE 11. FINISHED INNER TUBES

Tensile strength, kg/cm²	134 (1925 psi)
Relative elongation, %	734
Permanent elongation, %	25
Tear resistance, according to Goodrich, kg/cm²	41 (584 psi)

BULGARIA

Bulgarian attempts to produce synthetic rubber have not been very successful, and the existing plant has not been able to yield more than 100 kilograms a day. Now, it is understood a new plant will be built near Sophia, which, it is hoped, will produce one ton a day, and eventually 500 tons a year. The rubber will be useful for footwear, but probably not as yet for tires. It is expected that the process followed will yield caustic soda and a substitute for turpentine and lacquers as by-products.

GREAT BRITAIN

"Camel Tread" Sand Tires

Part of the success of the British Eighth Army in defeating Rommel in Africa is ascribed to the new "camel tread" sand tires developed by the Dunlop Rubber Co. for use in the desert. In 1935 an Egyptian officer of the Camel Corps and Car Patrols of the Egyptian Frontiers Administration suggested to the Dunlop company that instead of the sand tires in use at the time, which were not suitable for all desert conditions, the company should build a tire with the qualities of the broad-spreading feet of the camel and thus would not break up the surface of the sand. The Product Design Division at Fort Dunlop took up the matter, and after much experimentation with tiny, four-inch tires in trays of sand, developed a tire with the required qualities. The new tire is built to have maximum flexibility in both carcase and tread; the tread is wider and flatter than on the usual tires, and the tread design is an overall pattern of deeply incised squares almost completely separated one from the other. These features, it is claimed, reduce ground contact pressure to a minimum even pressure.

Mr. Lawley, manager of the Fort Dunlop car test team, made a trial run of 910 miles over desert in North Africa on these tires and on his trip encountered all types of desert. In one section was soft dry sand which flowed and had no hard crust at any depth or any time of day so that restarting was very difficult on this terrain. Elsewhere was sand with a thin hard crust on which traveling was good as long as the crust remained unbroken. Ordinary pneumatic tires break the crust, when it becomes impossible to start without pushing. He also met with wet sand with a crust of dried salt; if this is broken the car immediately sinks, and only the chassis frame prevents it from disappearing.

The new tires safely overcame all difficulties, and this type of tire is now used on tractors, ambulances, water carts, and general transport trucks from 13 hundredweight to three tons; distances that formerly took weeks to travel by camel are now frequently covered in a matter of hours.

Incidentally, it is said that Rommel would never have been able to reach El Alamein if he had not made use of captured British vehicles equipped with the new kind of tires.

Dunlop reported profits of £2,433,307 for 1942 as compared with £3,186,269 in 1941. The dividend again was 8%. Reserve for contingencies was increased by £100,000, and £627,586 was carried forward.

The President's Prizes

The President of the Institution of the Rubber Industry, Sir Walrond Sinclair, has offered two book prizes of £5 each for the best papers on any of a number of specified subjects. The competition is open to a member of any section of the IRI. Of the two President's Prizes (as they are to be known) one will be awarded a member under 25 years of age on January 1, 1943, and the other to a member over that age.

The subjects from which the competitors may choose are: rubber adhesives, with reference to the wartime situation, latex substitutes, synthetic latex, reclaim, and synthetic rubber adhesives; synthetic rubber processing, with constructive suggestions on handling and compounding, plan of fundamental research to solve such problems as synthetic rubber softening, tack, and hysteresis properties; synthetic rubber analysis, both qualitative and quantitative; vulcanized rubber at low temperatures, properties and performance, compounding for cold resistance, care and maintenance in low temperature service and storage; wartime, welfare, health and safety, with particular reference to the rubber industry; factory layout, e.g., suggestions for a rubber factory producing 1,000,000 pounds of manufactured articles a month (of 22 working days); 50% tires, 25% mechanicals, including rubber-metal bonding and spread goods, and 25% hand-built.

Closing date for entries is August 31, when all papers must be in the hands of the Secretary of the Institute. Selected papers may be read before meetings of the respective sections, and the papers as well as others may be published in the *Transactions of the Institute of the Rubber Industry.*

Eric Macfadyen Knighted

In recognition of his services to agriculture in the British Colonies, a knighthood has been conferred on Eric Macfadyen. Sir Eric was born in 1879 and educated at Oxford. He served in the South African war, receiving the Queen's Medal with three clasps. In 1902 he went East, serving first as a cadet in the Malayan Civil Service, and after 1905, as assistant on a rubber estate. From this time on most of his energies were devoted to the rubber plantation industry; he soon became known as a visiting agent and in the period of the rubber boom was much in demand as an appraiser. He became chairman of the old Planters' Association of Malaya and from 1911 to 1920 represented planting interests on the Federal Council, Malaya. For many years he has been connected with Harrisons & Crosfield, Ltd., of which he is a director; and he has been associated with numerous Far Eastern rubber companies, among them Prang Besar, a Malayan rubber estate widely known for the extent and quality of the work done in modern methods of selection.

He has presided over the Governing Body (in London) of the Imperial College of Tropical Agriculture. In 1927 Sir Eric was chairman of the Rubber Growers' Association and is still a member of its Council and Committee; in 1930 he was elected president of the Institution of the Rubber Industry and in 1931 and again in 1940 was president of the Association of British Malaya. At present farming and hop-growing are also claiming his attention, and he is besides a captain of the Twenty-first Battalion, Home Guards.

SPAIN

Since the end of the civil war Spain has been busily expanding her chemical industry, and a number of new plants have already been built or are planned, as well as extensions of existing factories. Among the newer undertakings are the manufacture of accelerators for the rubber industry by Rosaria Boronat Terol, and the manufacture of phenols, methanol, and heavy chemicals by the Union Quimico del Norte de Espana. The Sindicato Nacional de Industrias Quimicas (National Syndicate of Chemical Industries), created in 1939, to which all the Spanish companies belong, is largely responsible for the new developments. The syndicate, formed to stimulate and protect the industry, later established a research committee charged with promoting the manufacture of new products as well as of goods formerly imported, and also with encouraging the use of domestic raw materials.

GERMANY

The United States Eighth Air Force recently attacked the Ruhr region for the first time, and one of their targets was Huls, where the Germans have their second largest factory for the manufacture of Buna. Press reports indicate that the American bombers succeeded in wrecking the synthetic rubber plants.

Comparatively early in the present war it was stated that British bombs had struck the synthetic rubber factory at Huls, but with what effect was not definitely known.

FRANCE

The need of natural rubber in Germany is becoming more acute, and French manufacturers have been told to use only synthetic rubber. However under special conditions they may obtain natural rubber, but no application by a French manufacturer is considered unless backed by the respective German pilot firm. It will be recalled that a few months ago it was reported that French rubber manufacturers were invited to co-operate with selected German firms, apparently now known as "pilot firms."

Editor's Book Table

BOOK REVIEWS

"A.S.T.M. Standards on Electrical Insulating Materials." Prepared by A.S.T.M. Committee D-9 on Electrical Insulating Materials. Published by the American Society for Testing Materials, 260 S. Broad St., Philadelphia, Pa. February, 1943. Paper, 6 by 9 inches. 452 pages. Index. Price $2.50.

This latest edition of the work of A.S.T.M. Committee D-9 on Electrical Insulating Materials contains the 1942 compilation of standards. There are groups of specifications and tests on insulating varnishes, paints, lacquers, and molded insulating materials; for the latter, which includes plastics, are 14 test methods. The section on plates, tubes, and rods has two specifications and ten standard test methods. Three standards cover mineral oils for electrical insulation, and four other standards on ceramic products, including glass insulators, porcelain, and steatite.

The committee has carried out considerable work in the field of insulating paper, mica products, rubber and textile materials, all of which are represented by several standards and tests. The section on rubber products has specifications for friction tape, rubber insulating tape, electrical gloves, and rubber matting for use around electrical apparatus not exceeding 3,000 volts to ground. Published also is a proposed draft for rubber insulating blankets for the last mentioned purpose. The book contains the annual report of Committee D-9 and several condensed reports on significance of tests.

"Cotton Year Book of the New York Cotton Exchange. 1942." Prepared under the Direction of Elmer S. Bonner. Published by the New York Cotton Exchange, New York, N. Y. Cloth, 6 by 9 inches, 130 pages. Index. Price $1.75.

This is the fifteenth Cotton Year Book issued by the New York Cotton Exchange. It contains such of those series of statistics given in the fourteenth Year Book, extended to cover the 1941-42 season, as are now available. Preceding the main sections of the book, of which there are seven, is a Review of the 1941-42 season, which includes a summary of the supply and distribution of American cotton in the world, supply and distribution of foreign cottons in the world, government activities in the cotton trade, and price movements during the season. The other material in the volume is divided for the purpose of ready reference into sections on: production, movement, consumption, stocks, and supply and distribution of cotton; prices of cotton, yarn, and cloth, and cotton manufacturing and miscellaneous.

The Exchange also provides a *Basic Data Service* consisting of a loose-leaf volume containing most of tables given in this Year Book, together with other tables; pages containing revised and additional statistics issued periodically for insertion into the volume; weekly addenda sheets; and weekly reports.

"The House of Goodyear." 1943 Edition. Hugh Allen. Published by the Goodyear Tire & Rubber Co., Akron, O. Cloth 6 x 9 inches, 417 pages. Price $2.

The new edition of this very readable book is, as it was originally, more than a history of the Goodyear company in that it deals with the problems of the rubber industry as a whole, including the worldwide aspects of its raw materials, domestic and export markets for its products, industrial relations, and the general technology of the manufacture of rubber products. The book has now been brought up-to-date by a recital of the events of the last six or seven years to show the effect of the war clouds of the late 1930's on the industry's concern regarding natural rubber imports, stockpiling, Western Hemisphere rubber, and the development of our synthetic rubber program before and after Pearl Harbor.

The story of the development of the tire has some interesting information on the use of rayon cord, and the continuation of this story in discussing tires for airplanes then merges naturally into story of the Goodyear company's pioneering in the field of balloons and dirigibles.

"Expansion of Plants outside the United States" is also of particular interest in that the volume reports the experiences of the Goodyear men and their families in the Pacific area in extricating themselves before the onrushing Japanese. Considerable space is devoted to industrial relations, and the presentation of the story of the unionization of the Goodyear Akron plant following the 1936 strike, difficulties with the Wagner Act, 1938 troubles, and the Labor Board proceedings terminating in the October, 1941, contract are reported in order that this part of the industrial relations between employer and employe may be useful in understanding future developments.

The big problem of marketing and the working of competitive forces under the free enterprise system is given under "Distribution", and Goodyear activities in the war effort are treated in the section on "Defense Demands on Industry."

The book's illustrations are almost a story in themselves, and also included is a chronology of rubber from 1492 to 1942, a list of national balloon race winners, a list of international races, and a complete subject index.

NEW PUBLICATIONS

"Now is the time . . ." Report on Second Postwar Forum Sponsored by Carrier Corp., Syracuse, N. Y. 16 pages. The edited proceedings of this second postwar forum in which 19 industrial organizations including the sponsor and a representative of the War Production Board participated are presented in this booklet. As stated in the foreword, "postwar planning" is nothing other than what good business men have always been doing —preparing for the future. The forum emphasized practical realism as distinguished from theoretical vaporizings, it was pointed out. The first after-war responsibility of American business is to furnish full employment, and it was indicated that the forum believes this to be a practical undertaking. The discussions were concerned with such items as public confidence, red pins and red ink, railroads' problems, foreign trade, new adaptations, and the government's attitude. The booklet concludes with the following statement: "If business and government each continue to perform its own part in its own sphere, industry can achieve the underlying objective of all postwar planning—full employment under free enterprise."

"The Crystal Structure of β-Isoprene Sulphone." E. G. Cox and G. A. Jeffrey. Publicaton No. 29. British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C.3, England. 8 pages. A detailed X-ray analysis has shown that the molecule of β-isoprene sulphone has a heterocyclic structure in which resonance occurs between the three carbon-carbon bonds of the C_4S ring. The bond lengths are C—C (in the ring) 1.41 A., C (ring)—C (methyl) 1.54 A., C—S 1.75 A., and S—O 1.44 A., all $\pm$ 0.02 A.; the distribution of the four sulphur bonds is approximately tetrahedal.

"The Asbestos Factbook." Published by "Asbestos", Philadelphia, Pa. 16 pages. Price 10¢. This booklet contains information regarding asbestos, such as its geological origin, historical facts, geographical location, and a fairly detailed listing of the uses of asbestos and asbestos products. Typical analyses of three types of asbestos and a table of its qualities are included. The booklet should be useful to those who need, for one reason or another, the main facts on asbestos without hunting through many volumes.

"Kalvan in GR-S and GR-I." R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8 pages. June 4, 1943. Compound formulas and physical test results are given to show the usefulness of Kalvan (fine-particle-size coated calcium carbonate) for providing tack in cold uncured GR-S stocks, and as a light colored filler for high tensile and good tear resistant non-black GR-S stocks. The advantages of the use of Kalvan with channel carbon black in GR-I for increased loading, while maintaining low modulus, and the use of this material in non-black GR-I stocks to produce excellent tensile properties are also shown.

"Witcogum—A New Chemurgic Rubber." Wishnick-Tumpeer, Inc., 6200 W. 51st St., Chicago, Ill. Report 43-3. June 1943. 12 pages. Information on Witcogum, offered as a replacement for rubber and reclaim only for certain products which do not require high tensile strength, maximum elongation, or superior resistance to abrasion and flexing, is given in this bulletin. A section on compounding principles indicates the results that may be expected with the use of various standard rubber compounding ingredients, and there are also discussions of processing procedure and the effect of solvents and chemicals. Formulae and test results are given to show the use of Witcogum with reclaim "mud" as well as with reclaim itself. In the same manner a series of compounds containing varying proportions of Witcogum and natural rubber, Witcogum and GR-S, and Witcogum and Hycar OR-15 are given, together with physical test results to show what may be expected under these conditions. The ability of Witcogum to smooth out the compound on the mill when used with reclaim, GR-S, and Hycar OR-15 is described and illustrated.

"Synthetic Rubber—Its Production from Petroleum, Coal, and Other Materials." W. C. Holliman. United States Bureau of Mines, Information Circular 7242, Washington, D. C. May, 1943. 36 pages. This bulletin is useful in a general way as a review of some of the literature on the subject of synthetic rubbers, their chemical classification, and the raw materials from which they are made. The section on the description of properties of the individual synthetic rubbers is of interest because of the large number of both domestic and foreign rubbers that are covered, but suffers because of the inaccuracies of some of the statements made regarding rubbers produced in the United States. Under Buna S, which it is indicated is produced both in Germany and this country, the only method of processing given is plasticization by carefully controlled hot-air treatment. While this statement is true of German Buna S to some extent, it is not true of American Buna S, and the fact should be mentioned. It is also stated that synthetic rubber produced by the Hycar Chemical Co. is marketed under the trade name of Ameripol. The Hycar Chemical Co. does not market any synthetic rubber under the trade name of Ameripol; this name is used for products made of Hycar synthetic rubber sold by The B. F. Goodrich Co. The bulletin contains a bibliography on synthetic rubbers.

"Synthetic Rubber—Its Influence on Rubber Securities." Hirsch, Lilienthal & Co., 25 Broad St., New York, N. Y. 16 pages. This interesting brochure analyzes in an up-to-date manner the impact of the technical and chemical achievement of the founding of our synthetic rubber industry on the future of the rubber industry and in general on rubber securities. Because of the possibility of the lower and stabilizing effect of synthetic rubber prices as compared with crude rubber prices during the last 30 years, it is pointed out that securities of well-entrenched rubber companies may now be classed as "investments," a distinction they have not had in the past. It is also stated in discussing synthetic rubber that it is now well on its way toward establishing a place for itself—not as a substitute for crude, but as a material and product with its own identity and physical characteristics and yet superior to crude rubber in dozens of important ways. Among the other subjects covered are: Big Four and independents, large inventories now out, tires—big business, mechanical rubber goods—growing in importance, rubber invades the plastics industry, independents grow stronger, and aircraft tires—new big business.

"Crisis in Rubber." The B. F. Goodrich Co., Akron, O. 16 pages. As stated in the foreword, this booklet is not offered as a scientific discussion on the chemical structure of rubber, but reviews the status of natural and synthetic rubber and what has been accomplished to meet the most crucial situation that has ever confronted our nation. The discussion covers wild rubber, plantation rubber, which includes mention of the Latin American developments; domestic rubber, which refers to work with *kok-saghyz*, guayule, and *cryptostegia* as a source of rubber; and synthetic rubber, in which the work of the Goodrich company is reviewed and the properties of the leading commercial synthetic rubbers presented together with an illustrated flow chart showing the ingredients used in the production of synthetic rubbers. The booklet concludes with a synthetic rubber glossary and also has inserted in the last page a copy of a small pamphlet entitled, "A Chronology of the Development of Synthetic Rubber Since 1937."

"Rubber in War." *Congressional Record*, Vol. 89, No. 53. 10 pages. **"Survey of Plant and Equipment."** Industrial Accident Prevention Associations, 600 Bay St., Toronto, Ont., Canada. 8 pages. **"List of Inspected Electrical Equipment."** 480 pages, and **"Inspected Gas, Oil and Miscellaneous Appliances."** 16 pages. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill. **"Welding Service Range."** Harnischfeger Corp., Milwaukee, O. 8 pages. **"Women of Monsanto."** Monsanto Chemical Co., St. Louis, Mo. 16 pages. **"How to Repair Synthetic Tires Using Only Regular Materials."** United States Rubber Co., Rockefeller Center, New York, N. Y. 2 pages.

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CONDUCTIVITY OF RUBBER TREAD STOCKS. L. H. Cohan and J. F. Mackey, *Ind. Eng. Chem.*, July, 1943, pp. 806-808.

COPOLYMERIZATION IS THE PROCESS OF BUILDING A RUBBER-LIKE SUBSTANCE UNDER CONTROLLED SYNTHESIS. *Petroleum Refiner*, July, 1943, p. 124.

RUBBER AND THE PRESENT EMERGENCY. E. W. B. Owen, *India-Rubber J.*, May 29, 1943, pp. 12-14; June 5, pp. 11-13.

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EFFECTS OF PETROLEUM PRODUCTS ON SYNTHETIC VULCANIZATES. R. E. Morris, R. R. James, E. B. Caldwell, and T. A. Werkenthin, *Rubber Age (N. Y.)*, July, 1943, pp. 335-38.

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New Guinea

Reports from New Guinea and Australia indicate that steps are being taken to start the rubber plantations of New Guinea operating again. It seems that there is to be an Australian and New Guinea Production Control Board which will watch over the interests of the 56 rubber and cocoanut estates there. Apparently a Rubber Production Board is also being set up, and rubber growers or their representatives will be permitted to return to New Guinea under certain conditions.

The rubber area here represents about 20,000 acres.

Patents and Trade Marks

APPLICATION

United States

2,322,779. **Rubber Product Including a Rubber Coated Fabric, the Rubber Surface of Which Carries an Adherent Flexible Baked Film of Synthetic Linear Polyamide and Phenol-Aldehyde Resin.** W. S. Gocher, Fairfield, and A. J. Jennings, Bridgeport, both in Conn., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,322,835. **Replaceable Seal Unit for Sealing a Wall Opening, Which Includes a Resilient Diaphragm of Rubber-Like Material.** L. J. Dornhofer, assignor to Rotary Seal Co., both of Chicago, Ill.

2,322,842. **Emergency Plug to Control and Stop the Flow of Water in a Water Pipe of Small Diameter, Including an Elongated Rubber Sleeve on the Tube Having One End in Engagement with the Fixed Washer and Its Other End Adapted to Be Engaged by a Slidable Sleeve.** G. C. French, Yonkers, N. Y.

2,322,844. **Resilient Mounting or Coupling Including a Substantially Circular Metal Disk Having a Cut Out Portion Forming a Second Metal Part with Outwardly Projecting Arms Axially Alined with the Arms of the Disk, and Rubber between Each Pair of Axially Alined Arms and Connected thereto.** M. Goldschmidt, assignor to Metalastik, Ltd., both of Leicester, England.

2,322,879. **Composite Spring Assembly Including a Rubber Spring and Means to Vary Its Load Deflection Rate.** E. H. Piron, New York, N. Y., assignor to Transit Research Corp., a corporation of N. Y.

2,323,505. **Tire Tread Including a Plurality of Functionally Continuous Circumferentially Extending Ribs.** A. W. Bull, Grosse Pointe, Mich., assignor to United States Rubber Co., New York, N. Y.

2,323,702. **Shielded Rubber Insulated Cable in Which Ionizable Spaces between the Rubber and Shield Are Obviated by the Use of an Adhesive Tape between the Rubber Insulation and the Shield and in Contact with the Rubber; the Outer Face of the Tape Is Covered with Metal.** T. F. Peterson, Brooklyn, N. Y.

2,323,399. **Electrostatic Shield for Electrical Appliances Such as Spark Plugs Including a Hood Adapted to Fit Over the Appliance and Formed Essentially of Rubber with the Outer Layer thereof Composed of Conducting Rubber and the Inner Surface Electrically Insulating.** E. N. Jacobi, assignor to Briggs & Stratton Corp., both of Milwaukee, Wis.

2,323,449. **Improved Means to Open a Jar Having an Open Mouth with a Lip Protruding from the Outer Surface of the Wall and Surrounding the Mouth, and a Rubber Ring around the Mouth below the Lip.** S. Bright, Jr., Bern Township, Pa.

2,323,520. **Combination with a Shoe Heel, Including a Rubber Heel Lift on the Bottom thereof, of a Platelike Guard.** A. H. Deeley, Hawthorne, N. Y.

2,323,562. **Tread Member for Shoes, Including a Tread Surface Layer of Vinyl Resin, a Film of Chlorinated Rubber Adhesively Secured to the Vinyl Resin, and a Film Whose Basic Constituents Are a Copolymer of Butadiene and an Acrylonitrile, and a Toughening Agent of the Group Including Chlorinated Rubber and Vinyl Resin, Adhesively Secured to the Rubber Film.** F. V. Nugent, Abington, Mass., assignor to B. B. Chemical Co., Boston, Mass.

2,323,563. **Tread Member for Shoes, Including a Tread Surface Layer of Vinyl Resin, a Film of Chlorinated Rubber Adhesively Secured to the Vinyl Resin, a Film of Polymerized Chloroprene Adhesively Secured to the Chlorinated Rubber, and a Layer of Leather Adhesively Secured to the Polymerized Chloroprene.** F. V. Nugent, Abington, assignor to B. B. Chemical Co., Boston, both of Mass.

2,323,578. **Power File Including a Frame, a Pair of Endless Rubber V-Belts, and Means Mounting the Belts in Side by Side Relation with the Lower Stretches of the Belts Extending below the Frame.** F. P. Stull, Youngstown, O.

2,323,591. **Textile Printing Paste Having a Dispersion of Color in a Vehicle, Including a Solvent Having Dispersed therein a Color Binding Agent Consisting Essentially of Depolymerized Rubber and a Rubber Derivative of the Class Including Chlorinated Rubber and the Reaction Products of Rubber and Amphoteric Metal Halides in Amount Sufficient to Reduce Materially the Tack of the Rubber, but not Exceeding 50% of the Weight of the Rubber.** D. M. Gans, Bronx, assignor to Interchemical Corp., both in New York, N. Y.

2,323,687. **A Mop Including a Bowed, Resilient Rubber Member Forming a Loop and Having Circumferential Countersinks Adjacent Its Ends.** K. I. Strand, Huntington Park, Calif.

2,323,740. **Inflexible Rigid V-Type Power Belt Which Comprises a Rigid Steel Ring Reenforced Rubberized Belt, the Steel Ring Being Embedded in the Rubber Body Portion thereof, and a Rubberized Fabric Wrapper Disposed around and Vulcanized to the Rubber Body Portion Forming a Unitary Belt.** W. T. Wagner, Los Angeles, Calif., assignor to Dayton Rubber Mfg. Co., Dayton, O.

Dominion of Canada

413,196. **Adhesive Composition Suitable for Bonding Rubber to Fibrous Materials, Comprising an Admixture of Rubber, Carbon Black, a Potentially Reactive Phenolic-Aldehyde Resin and a Methylene-Containing Hardening Agent therefor, in an Organic Solvent for the Rubber.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of C. F. Brown and A. E. Brooks, co-inventors, both of Nutley, N. J., U. S. A.

413,197. **Pneumatic Tire Comprising Tread and Sidewall Portions of Rubber Composition and a Carcass Composed of a Plurality of Plies of Strain Resisting Elements, Certain of the Plies near the Interior of the Tire Being Separated by a Ply Construction, Having a Higher Cross-Sectional Tensile Strength per Inch Than Any of the Remaining Plies in the Carcass.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of H. S. Howe, Detroit, Mich., U. S. A.

413,202. **Corselette with Elastic Inserts.** Even-Pul Foundations, Inc., New York, assignee of I. Rosner, Forest Hills, both in N. Y., U. S. A.

413,263. **Railway Truck Having a Bolster Supported by Resilient Means Including Rubber Members and Friction Shoes Forced into Frictional Contact with the Bolster.** J. R. Cardwell, assignee of H. E. Tucker, both of Chicago, Ill., U. S. A.

413,276. **Mechanical Hand Finger Including a Hollow Tubular Rubber Sleeve Shaped to Simulate a Finger.** D. B. Becker, St. Paul, Minn., U. S. A.

413,358. **Wheel Balancer Having a Tiltable Wheel Supporting Unit Including an Elongated Holder, a Carrier Embracing the Holder and Adapted to Receive and Support a Wheel, and a Rubber Handle on the Holder.** General Tire & Rubber Co., assignee of H. T. Kraft, both of Akron, O., U. S. A.

413,490. **Insulated Electrical Conductor in Which the Insulation Comprises a Combination of Spun Glass and Polyvinylal Resin.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of R. W. Hall and H. A. Smith, co-inventors, both of Fort Wayne, Ind., U. S. A.

413,491. **Insulated Electrical Conductor in Which the Insulation Comprises a Heat-Hardenable Phenol-Aldehyde-Modified Polyvinylal Resin Heat Treated in Place to Produce a Hard, Flexible, Tough, Abrasion-Resistant Insulation.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of E. H. Jackson and R. W. Hall, co-inventors, both of Fort Wayne, Ind., U. S. A.

413,535. **Electric Blasting Cap Including a Thin Sleeve of Preformed Rubber-Like Elastic Material Serving as a Coating.** Hercules Powder Co., Wilmington, assignee of A. B. Miller, Newark, both in Del., U. S. A.

413,554. **Non-Skid Tire Having a Tread Portion Consisting of Straight and Serpentine Ribs.** M. C. O. Corp., assignee of M. C. Overman, both of New York, N. Y., U. S. A.

PROCESS

United States

2,322,226. **Imparting a Relief Design to a Flexible, Woven Fabric by Providing a Thin Sheet of Soft, Uncured Rubber at the Rear of the Fabric, Placing the Rubber and Fabric against a Smooth Support with the Rubber toward the Support, and Applying Pressure to the Fabric.** G. R. Cunnington, Grosse Pointe Park, assignor to National Automotive Fibres, Inc., Detroit, both in Mich.

2,322,242. **Producing a Coating Composition by Subjecting Rubber to a Depolymerizing Treatment and Then Colloidally Dispersing the Depolymerized Rubber in a Wax in Such Proportions and under Such Conditions That the Resulting Compound Possesses in Its Molten State an Immaterially Increased Viscosity over That Possessed by the Base Wax at the Same Temperature.** F. W. Lanigan, Belmont, and J. G. Mark, Cambridge, assignors to Dewey & Almy Chemical Co., North Cambridge, all in Mass.

2,322,886. **Method of Making an Adhesive Consisting in Its Unset State of a Liquid Vehicle and a Solids Content Incorporated therein, Comprising a Fused Mass of Asphalt, Resinous Material Having a Main Portion Comprising Hydrocarbon Polymers Resulting from Polymerization of the Di-Olefin Constituents of a Hydrocarbon Distillate and Rubber.** S. G. Saunders, Bloomfield Hills, and H. Morrison, Detroit, assignors to Chrysler Corp., Highland Park, all in Mich.

2,323,132. **Manufacturing Cut Rubber Threads or Strips by Cutting from a Vulcanized Sheet of Masticated Rubber a Number of Threads or Strips and Supporting Them in Side by Side Relation.** E. Hazell, North Kingstown, R. I., assignor to United States Rubber Co., New York, N. Y.

2,323,269. **Manufacture of Pile Fabrics Having a Natural Fibrous Pile Surface, Which Includes Interweaving a Natural Fibrous Pile with a Backing Structure Incorporating Inextensible Rubberized Threads of Textile Yarn.** A. Young, Glasgow, and I. Stewart, Edinburgh, both of Scotland.

2,324,083. **Making a Bearing Structure by Molding a Layer of Vulcanizable Rubber-Like Material to Provide Lubricant Grooves in a Face thereof Extending in One Direction of the Layer While Bonding the Material to a Layer of Stiffly Bendable Backing Material.** L. Holmes, Medina, O., assignor to B. F. Goodrich Co., New York, N. Y.

Dominion of Canada

412,907. **Molding a Plurality of Loop Pickers to Form a Hard Resilient Wear-Resistant Picker Including Building up the Body of the Picker from a Synthetic Rubber Bonded Laminated Fabric.** Dayton Rubber Mfg. Co., assignee of H. M. Bacon, both of Dayton, O., U. S. A.

413,147. **A Method of Utilizing Tanned Animal Hide Waste, Which Includes Disintegrating It, Passing the Disintegrated Matter through a Sieve, and Mixing It with Rubber Dough Containing a Solvent to Form a Substantially Homogenous Mass.** E. B. Cassatt, North Kenova, O., U. S. A.

413,215. **Making Resilient Bats from Steel Wool by Immersing the Bats into a Bath of Rubber Dissolved in a Solvent for Coating the Strands of Wool with the Rubber Compound, and upon Removal Curing the Rubber Coating on the Strands of the Bat Whereby the Solvent Is Evaporated and Adjacent Strands of Wool Are Bonded together by a Rubber Bond.** General Motors Corp., Detroit, Mich., assignee of W. J. Joyce, Jr., Southbridge, Mass., both in the U. S. A.

413,288. **Method of Applying a New Road-Engaging Tread Element to a Worn Tire Casing Having a Cross-Sectionally Normally Round Cord Carcass and a Worn Rubber Covering, Which Includes Applying an Annular Band of Uncured Tread Rubber to the Crown Tread Surface.** P. E. Hawkinson, Minneapolis, Minn., U. S. A.

413,523. **Making an Endless Belt of Laminated Rubber-Coated Fabric by Diagonally Cutting to Form a Series of Descending Steps the Plies of One End of a Laminated Rubber Coated Fabric Belt Material.** Dunlop Tire & Rubber Goods Co., Ltd., assignee of W. Uffelman, both of Toronto, Ont.

413,666. **Method for Producing Fibers of Vinyl Resin Stretched Fibers Which, in the As-Stretched Condition, Have Sufficiently High Tensile Strengths, Elasticities, and Elongations, and Sufficiently Low Shrinkage Characteristics to Adapt the Fibers for Use in the Production of Textiles without a Setting Treatment to Reduce Further the Shrinkage Characteristics of the Fibers.** Carbide & Carbon Chemicals, Ltd., Toronto, Ont., assignee of T. A. Field, Jr., Charleston, W. Va., U. S. A.

United Kingdom

553,072. **Games, Balls, Composed of or Containing Rubber or the Like.** D. F. Twiss, A. E. T. Neale, and Dunlop Rubber Co., Ltd.

553,249. **Treating Dilute Aqueous Rubber Dispersions.** I. Kemp. (Revertex, Ltd.).

553,513. **Sponge Rubber from Aqueous Rubber Dispersions and the Products Obtained Thereby.** United States Rubber Co.

553,545. **Impregnation of Organic Fibrous Materials with Polystyrene.** A. A. New and S. G. Foord (Standard Telephones & Cables, Ltd.).

553,577. **Coloring Rubber Articles.** S. Dearnaley and Guide Bridge Rubber Co., Ltd.

553,609. **Impregnating Woven Hose Pipes, Etc. with Latex or with Solutions of India Rubber or Other Similar Plastic Materials.** F. S. Zabala.

553,674. **Treating Vulcanized Rubber or the Like Containing Embedded Textile Fibrous Material.** D. F. Twiss and A. J. Hughes (Dunlop Rubber Co., Ltd.).

553,732. **Safety Tube for Pneumatic Tires.** Wingfoot Corp.

(Continued on page 508)

Market Reviews

COMPOUNDING INGREDIENTS

THE major problems which have been plaguing synthetic rubber manufacture are now on the way to solution. The July chemical market saw the synthetic program progressing along more definite lines, but authorities claim it will be 1944 before the great manufacturing project really hits its stride.

ACRYLONITRILE. The market position is tight. Price schedules show no alterations.

BARYTES. Transactions are routine. Tone is stable.

BENZOL. Synthetic rubber and aviation gasoline needs are ever increasing. Production estimates have risen recently. All material is under WPB allocation.

CARBON BLACK. Stocks of carbon blacks show a continuous reduction in consequence of the heavy absorption of furnace blacks by users of synthetic rubber. The entire market for these blacks is developing conspicuous strength.

Manufacturers requiring furnace-type carbon black in quantities between 100 pounds and 5,000 pounds in any month now need not obtain direct or specific allocation from the WPB. Under the new procedure, such orders are placed directly upon suppliers of carbon black, who in turn on the twentieth of each month furnish the WPB Chemicals Division with a list of orders received. The Chemicals Division then confirms or denies the orders.

Under this change, General Preference Order M-244 is amended to become Allocation Order M-244 effective July 20.

For amounts of more than 5,000 pounds specific allocation must be made.

The order specified the primary products for which furnace-type carbon black may be used as follows: crude rubber, liquid latex, whole tire reclaim, all other reclaim, scrap rubber, Buna S, Buna N, Butyl, "Thiokol", neoprene.

CASEIN. With domestic production again on the wane, and with receipt of Argentinian imports more than a month away, the market's offerings are extremely lean. Stocks of the domestic grade displayed amazing diminution within the past year. Latest Department of Agriculture reports show these stocks touching a level, on June 1, 62% below that recorded at the corresponding date in 1942.

CHINA CLAY. Only a slow, meager movement is noted in this material. Buying interest is still limited. Tone is steady.

MICA. Brisk demand exists for minutely ground mica, and fair movement is noted also in almost all other varieties of water-ground material. Dry-ground goods are likewise in moderate request. Producers are still able to keep pace with orders; while prices hold firmly.

PIGMENTS. Extensive purchasing of litharge on a military account is being supplemented by a renewal of buying on civilian scores. Prices are well maintained.

RUBBER SOLVENTS. The current demand for rubber solvents has slightly increased over the past several months, and there is a marked increase in all solvent sales over the same period last year.

SYNTHETIC RESINS. Demand for all synthetic resins continues rampant, but unsatisfied for the most part as far as civilian usages are concerned. WPB has a constantly tightening grip on the supply situation of raw as well as finished materials.

TOLUOL. Heavy movement of toluol is channeled into explosive and other war manufacture, and little is to be had for any but most essential needs. Price picture is steady.

ZINC OXIDES. The demand for zinc oxide from consuming industries vital to the war effort is exceedingly heavy in addition to the demands of direct sales to government agencies. Little chance of any abatement in this demand is seen in the near future. The industry, however, continues to supply the demands of the rubber trade without much delay.

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.035	/$0.04
Rottenstone, domestic	lb.	.025	.03

Accelerators, Inorganic

Lime, hydrated, *l.c.l.*, New York	ton	25.00	
Litharge (commercial)	lb.	.09	
Magnesia, calcined, heavy	lb.		
technical, light	lb.	.0625	/ .07

Accelerators, Organic

A-1	lb.	.28	/ .33
A-10	lb.	.36	/ .42
A-19	lb.	.52	/ .65
A-32	lb.	.60	/ .70
A-46	lb.	.50	/ .57
A-77	lb.	.42	/ .55
A-100	lb.	.42	/ .55
Accelerator 49	lb.	.41	/ .42
808	lb.	.59	/ .61
833	lb.	1.13	/ 1.15
Acrin	lb.	.65	
Advan	lb.	.55	
Aldehyde ammonia	lb.	.65	/ .70
Altax	lb.	.43	/ .45
Arazate	lb.	1.53	
B-J-F	lb.	.38	/ .43
Beutene	lb.	.59	/ .64
Butasan	lb.	1.13	
Butazate	lb.	1.13	
Butyl Eight	lb.	.97	/ .99
C-P-B	lb.	1.95	
Captax	lb.	.38	/ .40
D-B-A	lb.	1.95	
Delac A	lb.	.39	/ .48
O	lb.	.39	/ .48
P	lb.	.39	/ .48
Di-Esterex-N	lb.	.50	/ .57
DOTG (Diorthotolylguanidine)	lb.	.44	/ .46
DPG (Diphenylguanidine)	lb.	.35	/ .36
El-Sixty	lb.	.40	/ .47
Erie Accelerator	lb.	.60	/ .62
Ethasan	lb.	1.13	
Ethazate	lb.	1.13	
Ethylideneaniline	lb.	.42	/ .43
Formaldehyde P.A.C.	lb.	.06	/ .0625
Formaldehyde-para-toluidine	lb.	.63	/ .65
Formaniline	lb.	.36	/ .37
Guantal	lb.	.39	/ .48
Hepteen	lb.	.34	/ .39
Base	lb.	1.25	/ 1.40
Hexamethylenetetramine			
U.S.P.	lb.	.39	
Technical	lb.	.33	
Lead oleate, No. 999	lb.	.135	
Witco	lb.	.15	
Ledate	lb.	1.48	
M-B-T	lb.	.38	/ .40
M-B-T-S	lb.	$0.43	/$0.45
Methasan	lb.	1.23	
Methazate	lb.	1.23	
Monex	lb.	1.53	
Morfex "33"	lb.	.67	/ .72
"55"	lb.	.96	/ 1.01
O-X-A-F	lb.	.38	/ .43
Para-nitroso-dimethylaniline	lb.	.85	
Pentex	lb.	.74	/ .84
Flour	lb.	.1225	/ .1325
O	lb.		
Flour	lb.		
Phenex	lb.	.49	/ .54
Pipazate	lb.	1.53	
Pip-Pip	lb.	1.63	
R & H 50-D	lb.	.42	/ .43
Rotax	lb.	.48	/ .50
Safex	lb.	1.15	/ 1.25
Santocure	lb.	.60	/ .67
Selenac	lb.	1.98	
SPDX	lb.	.69	/ .74
A	lb.	.69	/ .74
SRA No. 1	lb.	.38	/ .50
Super sulphur No. 2	lb.	.13	/ .15
Tetrone A	lb.	2.20	
Thiocarbanilide	lb.	.28	/ .33
Thiofide	lb.	.43	/ .50
Thionex	lb.	1.53	
Thiotax	lb.	.38	/ .45
Thiurad	lb.	1.53	
Thiuram E	lb.	1.53	
M	lb.	1.53	
Trimene	lb.	.54	/ .64
Base	lb.	1.03	/ 1.18
Triphenylguanidine (TPG)	lb.	.45	
Tuads, Methyl	lb.	1.53	
Tuex	ton	1.53	
2-MT	lb.	.58	/ .60
Ulto	lb.	.99	/ 1.04
Ureka	lb.	.50	/ .57
Blend B	lb.	.50	/ .57
C	lb.	.48	/ .55
Vulcanex	lb.	.42	/ .43
Z-B-X	lb.	2.45	
Zenite	lb.	.40	/ .42
A	lb.	.45	/ .47
B	lb.	.42	/ .44
Zimate, Butyl	lb.	1.13	
Ethyl	lb.	1.13	
Methyl	lb.	1.23	
Zipacel	lb.	1.65	

Activators

Aero Ac 50	lb.	.46	/ .52
Barak	lb.	.50	
MODX	lb.	.295	/ .345
SL-20	lb.	.1089	/ .1135

Age Resisters

AgeRite Alba	lb.	1.95	/ 2.05
Gel	lb.	.52	/ .54
Hipar	lb.	.61	/ .63
Powder	lb.	.43	/ .45
Resin	lb.	.43	/ .45
D	lb.	.43	/ .45
White	lb.	1.23	/ 1.33
Akroflex C	lb.	.53	/ .65
Albasan	lb.	.69	/ .74
Aminox	lb.	.43	/ .52
Antox	lb.	.54	/ .56
Betanox	lb.	.43	/ .52
B-L-E	lb.	.43	/ .52
Powder	lb.	.61	/ .70
B-X-A	lb.	.43	/ .52
Copper Inhibitor X-872-A	lb.	1.15	
Flectol H	lb.	.43	/ .55
White	lb.	.89	/ 1.00
M-U-F	lb.	1.48	
Neozone (standard)	lb.	.61	/ .63
A	lb.	.43	/ .45
C	lb.	.43	/ .55
D	lb.	.43	/ .45
Distilled	lb.	.48	/ .50
E	lb.	.61	/ .63
Oxynone	lb.	.77	/ .90
Permalux	lb.	1.18	/ 1.20
Santoflex B	lb.	.43	/ .55
BX	lb.	.54	/ .64
Santovar O	lb.	1.15	/ 1.40
Stabilite	lb.	.48	/ .69
Alba	lb.	.50	/ .74
Thermoflex A	lb.	.61	/ .63
C	lb.	.54	/ .56
Tysonite	lb.	.165	/ .17
V-G-B	lb.	.43	/ .52

Alkalies

Caustic soda, flake, Columbia (400-*lb. drums*)	100 *lbs.*	2.70	/ 3.55
Liquid, 50%	100 *lbs.*	1.95	
Solid (700-*lb. drums*)	100 *lbs.*	2.30	/ 3.15

Antiscorch Materials

Antiscorch T	lb.	.90	
Cumar RH	lb.	.105	
E-S-E-N	lb.	.34	/ .39
R-17 Resin (*drums*)	lb.	.1075	
RM	lb.	1.25	
Retarder W	lb.	.36	
Retardex	lb.	.445	/ .475
U-T-B	lb.	.34	/ .39

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed, and those readers interested should contact suppliers for spot prices.

Antiseptics

Compound G-4	lb.	$1.25
G-11	lb.	5.65

Antisun Materials

Heliozone	lb.	.23 / $0.24
S.C.R.	lb.	.32 / .34
Sunproof	lb.	.2275 / .2775
Jr.	lb.	.165 / .215

Blowing Agents

Ammonium Carbonate, lumps (500-*lb. drums*)	lb.	.0825
Unicel	lb.	.50

Brake Lining Saturant

B.R.T. No. 3	lb.	.0175 / .0185

Colors

Black

Du Pont powder	lb.	.42
Lampblack (commercial), *l.c.l.*	lb.	.15

Blue

Du Pont Dispersed	lb.	.35 / .95
Powders	lb.	2.25 / 3.75
Heliogen BKA	lb.	
Toners	lb.	

Brown

Mapico	lb.	.1135

Green

Chrome	lb.	.25
Oxide (*freight allowed*)	lb.	.24
Du Pont Dispersed	lb.	.98 / 2.85
Powders	lb.	1.00
Guignet's (*bbls.*)	lb.	.70
Toners	lb.	

Orange

Du Pont Dispersed	lb.	.88 / 2.35
Powders	lb.	2.75 / 3.05
Toners	lb.	

Orchid

Toners	lb	**

Pink

Toners	lb	**

Purple

Toners	lb	**

Red

Antimony		
Crimson, 15/17%	lb.	
R.M.P. No. 3	lb.	.48
Sulphur free	lb.	.52
Golden 15/17%	lb.	
7-A	lb.	.37
Z-2	lb.	.25
Cadmium, light (400-*lb. bbls.*)	lb.	.85 /
Du Pont Dispersed	lb.	.93 / 2.05
Powders	lb.	.60 / 1.65
Iron Oxide, *l.c.l.*	lb.	.0675 / .15
Mapico	lb.	.0885 / .096
Rub-Er-Red (*bbls.*)	lb.	.0975
Toners	lb.	

White

Lithopone (*bags*)	lb.	.0425 / .045
Albalith	lb.	.0425 / .045
Astrolith (50-*lb. bags*)	lb.	.0425 /
Azolith	lb.	.0425 / .045
Titanium Pigments		
Ray-Bar	lb.	.0575 / .0625
Ray-Cal	lb.	.055 / .06
Rayox	lb.	.145 / .155
Titanolith (50-*lb. bags*)	lb.	.056 / .0575
Titanox-A LO and MO	lb.	.145 / .15
C	lb.	.055 / .0575
Ti-Tone	lb.	
Zopaque (50-*lb. bags*)	lb.	.145 / .1525
Zinc Oxide		
Azo ZZZ-11	lb.	.0725 / .075
44	lb.	.0725 / .075
55	lb.	.0725 / .075
66	lb.	.095 / .0975
French Process, Florence		
Green Seal-8	lb.	.09 / .0925
Red Seal-9	lb.	.085 / .0875
White Seal-7	lb.	.095 / .0975
Kadox, Black Label-15	lb.	.0725 / .075
No. 25	lb.	.085 / .0875
72	lb.	.0725 / .075
Red Label-17	lb.	.0725 / .075
Horse Head Special 3	lb.	.0725 / .075
XX Red-4	lb.	.0725 / .075
23	lb.	.0725 / .075
72	lb.	.0725 / .075
78	lb.	.0725 / .075
80	lb.	.0725 / .075
103	lb.	.0725 / .075
110	lb.	.0725 / .075
St. Joe (lead free)		
Black Label	lb.	.0725 / .075
Green Label	lb.	.0725 / .075
Red Label	lb.	.0725 / .075
U.S.P.	lb.	.105 / .1075
Zinc Sulphide Pigments		
Cryptone-BA-19	lb.	.056 / .0585
BT	lb.	.056 / .0585
CB	lb.	.056 / .0585
MS	lb.	.0575 / .06
ZS No. 20	lb.	.0825 / .085
86	lb.	.0825 / .085
230	lb.	.0825 / .085
800	lb.	.0825 / .085
Sunolith	lb.	.0425 /

** Because of difficulty in interpreting OPA ceilings, consumers should contact supply houses for prices.

Yellow

Cadmolith (cadmium yellow), (400-*lb. bbls.*)	lb.	$0.60
Du Pont Dispersed	lb.	1.25 / $1.85
Powders	lb.	.70 / 1.75
Mapico	lb.	.0685 / .071
Toners	lb.	

Dispersing Agents

Bardex	lb.	.0425 / .045
Bardol	lb.	.025 / .0275
B	lb.	.05 / .0525
Nevoll (*drums, c.l.*)	lb.	.02 / .025

Extenders

Advagum 1098	lb.	.42
1198	lb.	.40
Extendex C	lb.	
Naftolen	lb.	.15 / .20
Oroplast	lb.	.11 / .155
"600"	lb.	.14 / .16
Vanzak	gal.	.05 / .06

Fillers, Inert

Asbestine, *c.l.*	ton	20.00
Asbestos Fiber	ton	15.50 / 48.00
Barytes	ton	40.00
f.o.b., St. Louis (50-*lb. paper bags*)	ton	25.55
Off color, domestic	ton	29.00
White, domestic	ton	38.50 / 40.00
Blanc fixe, dry, precip	ton	80.00
Calcene	ton	37.50 / 43.00
Infusorialearth	lb.	.0225
Kalite No. 1	ton	26.00
3	ton	36.00
Kalvan	ton	100.00
Magnesium Carbonate *l.c.l.*	lb.	.0625 / .1075
Paradene No. 2 (*drums*)	lb.	.0525
Pyrax A	ton	7.50
Whiting		
Suprex White	ton	32.50
Witco, *c.l.*	ton	8.00
Witcarb	lb.	

Finishes

Mica, *l.c.l.*	ton	20.00 / 40.00
Rubber lacquer, clear	gal.	1.00 / 2.00
Colored	gal.	2.00 / 3.50
Shoe varnish	gal.	1.45
Talc	ton	25.00 / 35.00

Flock

Cotton flock, dark	lb.	.095 / .11
Dyed	lb.	.50 / .80
White	lb.	.12 / .20
Rayon flock, colored	lb.	1.00 / 1.50
White	lb.	.90 / 1.00

Latex Compounding Ingredients

Accelerator 552	lb.	1.63
Aerosol OT Aqueous 25%	lb.	
Antox, dispersed	lb.	.54
Aquarex D	lb.	.75
F	lb.	.85
MDL Paste	lb.	.25
Areskap No. 50	lb.	.18 / .24
100, dry	lb.	.39 / .51
Aresket No. 240	lb.	.16 / .22
300, dry	lb.	.42 / .50
Aresklene No. 375	lb.	.35 / .50
400 dry	lb.	.51 / .65
Black No. 25, dispersed	lb.	.22 / .40
Casein, muriatic 30-mesh	lb.	
Collocarb	lb.	.07
Color Pastes, dispersed	lb.	.75 / 1.10
Copper Inhibitor X-872	lb.	2.25
Darvan No. 1	lb.	.30 / .34
2	lb.	.30 / .34
3	lb.	.30 / .34
Dispersex No. 15	lb.	.11 / .12
No. 20	lb.	.08 / .10
Factex Dispersion A	lb.	.185
Heliozone, dispersed	lb.	.25
MICRONEX, Colloidal	lb.	.06
R-2 Crystals	lb.	1.55
S-1 (400-*lb. drums*)	lb.	.65
Santobrite Briquettes	lb.	
Powder	lb.	
Santomerse D	lb.	.41 / .65
S	lb.	.11 / .25
Sodium Stearate	lb.	.40
Stablex A	lb.	.90 / 1.10
B	lb.	.70 / .95
C	lb.	.40 / .50
Sulphur, dispersed	lb.	.10 / .15
No. 2	lb.	.08 / .12
T-1 (440-*lb. drums*)	lb.	.40
Tepidone	lb.	.63
Tetrone A	lb.	2.20
Tysonite, dispersed	lb.	.32 / .35
Zenite Special	lb.	.47
Zinc oxide, dispersed	lb.	.12 / .15

Mineral Rubber

Black Diamond, *l.c.l.*	ton	25.00 / 30.00
B.R.C. No. 20	lb.	.0105 / .0115
Hydrocarbon, Hard	ton	25.00 / 27.00
MilliMar	lb.	.055
Parmr	ton	
Pioneer, *c.l.*	lb.	25.00 / 30.00
285°-300°	ton	25.00 / 27.00

Mold Lubricants

Aluminum Stearate	lb.	.23 / .24
Aquarex D	lb.	.75
MDL Paste	lb.	.25
Colite	gal.	.90 / 1.15
Dipez Mold Wash	lb.	
Lubrex	lb.	.25 / .30
Rubber-Glo, conc. regular	gal.	$0.94 / $1.15
Type W	gal.	.99 / 1.20
Sericite	ton	65.00
Soapstone, *l.c.l.*	ton	25.00 / 35.00
Zinc Stearate	lb.	.30 / .31

Oil Resistant

A-X-F	lb.	.82 / .85

Reclaiming Oils

B.R.V.	lb.	.035 / .0375
C-10	gal.	.19 / .24
D-4	gal.	.17 / .22
E-5	gal.	.15 / .20
No. 1621	lb.	.021 / .0235
S.R.O.	lb.	.02 / .0225
X-60 (reclaiming)	gal.	.20 / .27
X-443	gal.	.29

Reenforcers

Alumina, Hydrated		
Alorco C-740	lb.	.0375 / .065
C-741	lb.	.0375 / .065
Buca	ton	40.00
Carbon Black		
Aerfloted Arrow Specification (*bags only*)	lb.	.0355†
Arrow Compact Granulized	lb.	.0355†
Certified Heavy Compressed (*bags only*)	lb.	.0355†
SPHERON	lb.	.0355† / .07
Channel "S"	lb.	.12
Continental, dustless	lb.	.0355†
"AA"	lb.	
Compressed (*bags only*)	lb.	.0355†
Disperso	lb.	.0355†
Dixie	lb.	.0355†
20	lb.	.035†
Dixiedensed	lb.	.0355†
66	lb.	.0355†
77	lb.	.0355†
Furnex	lb.	.035
Beads	lb.	.035
Gastex	lb.	.035 / .06
HX	lb.	.0355†
Kosmobile	lb.	.0355†
66	lb.	.0355†
77	lb.	.0355†
S	lb.	.0355†
Kosmos	lb.	.0355†
20	lb.	.035†
MICRONEX Beads	lb.	.0355†
Hi-Tear	lb.	.0355
Mark II	lb.	.0355
Standard	lb.	.0355
W-5	lb.	.0355
W-6	lb.	.0355
P-33	lb.	.0475
Pelletex	lb.	.035 / .06
SPHERON C (*bags*)	lb.	.0455†
I (*bags*)	lb.	.0405
N (*bags*)	lb	.15
T (*bags*)	lb	.09
Statex	lb.	
STERLING	lb.	.035
Thermax	lb.	.0225
"S"	lb.	.0675
TX	lb.	.0355†
Velvetex	lb.	
"WYEX BLACK"	lb.	.0355†
Carbonex Flakes	lb.	.03 / .035
S	lb.	.031 / .036
Plastic	lb.	.031 / .0335
Clays		
Aerfloted Hi-White	ton	10.00
LGB	ton	15.00
Paragon (50-*lb. bags*)	ton	10.00
Suprex (50-*lb. bags*)	ton	10.00 / 23.50
Catalpo, *c.l.*	ton	30.00
China	ton	25.00
Dixie	ton	10.00 / 22.50
"L"	ton	10.00
Langford	ton	8.50
McNamee	ton	10.00
Par	ton	10.00
Paraforce, *c.l.*	ton	50.00
#33	ton	30.00
Witco, *c.l.*	ton	10.00
Cumar EX	lb.	.05
MH	lb.	.065 / .115
V	lb.	.095 / .125
465 Resin	lb.	
"G" Resin	lb.	
Nevindene	lb.	
Silene "EF"	lb.	.055 / .06

Reodorants

Amora A	lb.	
B	lb.	
C	lb.	
D	lb.	
Para-Dors (ABCD)	lb.	1.00 / 3.40
Rodo No. 0	lb.	4.00 / 4.50
10	lb.	5.00 / 5.50

Rubber Substitutes

Black	lb.	.095 / .17
Brown	lb.	.095 / .18
White	lb.	.10 / .20
Factice		
Amberex Type B	lb.	.20
Brown	lb.	.095 / .19
Neophax A	lb.	.165
B	lb.	.165
White	lb.	.10 / .20
Polyester, Millable 56-40A	lb.	.36 / .38

†Price quoted is f.o.b. works (bags). The price f.o.b. works (bulk) is $0.033 per pound. All prices are carlot.

Vulprene 72-28AR	lb.	$0.40	/ $0.45
Dispersion B7-41	lb.	.25	/ .26
Emulsion D4-31A	lb.	.29	/ .295

Softeners and Plasticizers

Ambidex Regular	lb.		
S	lb.		
B.R.T. No. 7	lb.	.02	/ .021
Bondogen	lb.	.98	/ 1.05
Buna Modifier 56-10	lb.	.30	/ .31
Bunnatol (for synthetic rubber)	lb.		
G	lb.	.40	/ .50
S	lb.	.40	/ .50
Burgundy pitch	lb.		
Copene Resin	lb.	.32	
Dipolymer Oil	gal.	.33	/ .38
Dispersing Oil No. 10	lb.	.0375	/ .04
Falkomer 106	lb.	.30	
108	lb.	.30	
LM-Nypene (drums)	lb.	.25	
LX-436 (tank car)	lb.	.027	
Myristilene	lb.	.20	/ .30
Nevinol	lb.	.13	/ .14
Nuba resinous pitch (drums) Grades No. 1 and No. 2	lb.	.29	
3-X	lb.	.0425	
Nypene Resin	lb.	.32	
Palm oil (Witco), c.l.	lb.		
Palmalene	lb.	.15	/
Palmol	lb.	.16	/ .25
Para Flux (reg.)	gal.	.17	/ .18
No. 2016	gal.	.135	/ .19
Para Lube	lb.	.046	/ .048
Paradene No. 1 (drums)	lb.	.0525	
Special (drums) 20 to 35° C. M.P.	lb.	.0625	
35 to 45° C. M.P.	lb.	.0625	
45 to 75° C. M.P.	lb.	.0575	
Peptizene	lb.	.65	
Piccocizer "30"	lb.		
Piccolyte Resins	lb.	.15	/ .185
Piccoumaron Resins	lb.	.045	/ .15
Pictar	gal.	.18	/ .23
Pine tar	gal.		
Oil	gal.	.42	
Plasticizer B	lb.	.35	/ .45
Plastoflex No. 10	lb.	.20	
No. 20	lb.	.25	
Plastogen	lb.	.0775	/ .08
Plastone	lb.	.27	/ .30
R-19 Resin (drums)	lb.	.1075	
21 Resin (drums)	lb.	.1075	
Reogen	lb.	.115	/ .12
RPA No. 1E	lb.	.55	
2	lb.	.65	
3	lb.	.46	
4	lb.	.80	
"S-Oil"	gal.	.15	/ .20
Tarzac	lb.	.23	/ .24
Tonox	lb.	.50	/ .59
Turgum	lb.	.07	/ .0735
S	lb.	.0625	/ .0675
Vistac No. 1	lb.	.20	/ .214
No. 2	lb.	.214	/ .227
Witco No. 20, l.c.l.	gal.	.20	
X-1 resinous oil (tank car)	lb.	.011	/ .016
XX-100 Resin	lb.	.0525	

Softeners for Hard Rubber Compounding

Resin C Pitch 45°C. M.P.	lb.	.015	/ .016
60°C. M.P.	lb.	.015	/ .016
75°C. M.P.	lb.	.015	/ .016

Solvents

Beta-Trichlorethane	lb.	.20	
Carbon Bisulphide	100 lbs.	5.75	
Tetrachloride	gal.	.80	
Cosol No. 1	gal.	.26	
No. 2	gal.	.25	
No. 3	gal.	.22	
Industrial 90% benzol (tank car)	gal.	.15	/ .22
Nevsol	gal.	.245	/ .31
Picco	gal.	.22	/ .32
Skellysolve	gal.		

Stabilizers for Cure

Barium Stearate	lb.	.29	/ .32
Calcium Stearate	lb.	.26	/ .27
Laurex (bags)	lb.	.1475	/ .1725
Lead Stearate	lb.		
Magnesium Stearate	lb.	.31	/ .32
Stearex B	lb.		
Beads	lb.		
Stearic acid, single pressed	lb.		
Stearite, c.l.	lb.	.1487	
Zinc Laurate	lb.	.29	/ .32
Stearate	lb.	.30	/ .31

Synthetic Rubber

Agripol Solids l.c.	lb.	.44	/ .52
Solutions l.c.	lb.	.27	/ .29
Hycar OR-15	lb.	.63	
OR-25	lb	.56	
OS-10	lb.	.56	
Neoprene Latex Type 571	lb.	.25	
60	lb.	.36	
Neoprene Type CG	lb.	.70	
E	lb.	.65	
FR	lb.	.75	
GN::	lb.	.28	/ .30
ILS	lb.	.70	
KNR	lb.	.75	
M	lb.	.65	
Perbunan 26	lb.	.63	
Synthetic 100	lb.	.41	
"Thiokol" Type "A"	lb.	.35	
"FA"	lb.	.50	
Molding powder No. 472	lb.	.61	
1001	lb.	.75	

Tackifiers

B.R.H. No. 2	lb.	$0.02	/ $0.021
Buna Tackifier 56-36	lb.	.28	/ .30
LX-433 (tank car)	lb.	.068	
P.H.O. (drums)	lb.	.24	
Plastac	lb.	.12	
TY-PLY (Q, S and SC)	gal.	6.75	/ 8.75

Vulcanizing Ingredients

Magnesia, light (for neoprene)	lb.	.25	/
Sulphur	100 lbs.	2.05	
Chloride (drums)	lb.	.04	
Telloy	lb.	1.75	
Thiogen 6	lb.	.18	/ .25
10	lb.	.18	/ .25
Vandex	lb.	1.75	
(See also Colors—Antimony)			

Waxes

1515-A (black)	gal.	1.35	
C (clear)	gal.	1.25	
Carnauba, No. 3 chalky	lb.	.7125	/ .7225
2 N.C.	lb.	.7575	/ .7675
3 N.C.	lb.		
1 Yellow	lb.	.8325	
2	lb.	.8125	
Carnube	lb.	.49	/ .59
Monten	lb.	.12	/ .17
Rubber Wax No. 118. Neutral	gal.	.76	/ 1.31
Colors	gal.	.86	/ 1.41

Fixed Government Prices*

Balata	Price per Pound: Civilian Use	Other Than Civilian Use
Manaos Block	$0.38¾	$0.38¾
Swinam Sheet	.42½	.42½
Guayule		
Guayule (carload lots)	.17½	.31
Latex		
Normal (tank car lots)	.26	.43½
Creamed (tank car lots)	.26¾	.44¼
Centrifuged (tank car lots)	.27¾	.45¼
Heat-Concentrated (carload drums)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	.40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅜	.38⅞
2X Brown Crepe	.21⅛	.38⅝
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅝
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	.45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.15½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	26⅛
(washed and dried)	.20¼	.37¾
Islands Fine (crude)	.14⅝	.28¼
(washed and dried)	.22½	.40
Caucho Ball (crude)	.11⅝	.24¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	35½

*For a complete list of all grades of all rubbers, including crude, balata, guayule, synthetic, and latex, see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

RECLAIMED RUBBER

ALTHOUGH Amendment No. 7 to OPA Revised Price Schedule 87—Scrap Rubber—effective July 1, raised the price that reclaimers pay for scrap rubber about $2 a ton, no changes in the prices of reclaimed rubber are considered probable at present. The OPA has issued a statement that after consultation with the industry it had received assurances the increase in scrap rubber prices permitted by this amendment can be absorbed without affecting prices for reclaimed rubber or finished rubber products.

It is possible that an even greater demand for reclaimed rubber for use in recapping will result from the campaign to be instituted by the Petroleum Industry War Council with the support of the Office of the Rubber Director to make sure that motorists recap their tires when necessary in order to avoid wearing their tires beyond the stage where they may be successfully recapped.

Ceiling prices on selected grades of natural rubber reclaim are listed below:

Ceiling Prices

Auto Tire	Sp. Grav.	¢ per Lb
Black Select	1.16-1.18	6½ / 6¾
Acid	1.18-1.22	7½ / 7¾
Shoe		
Standard	1.56-1.60	7 / 7¼
Tubes		
Black	1.14-1.26	11¼ / 11½
Gray	1.15-1.26	12½ / 13¼
Red	1.15-1.32	12 / 12¼
Miscellaneous		
Mechanical blends	1.25-1.50	4½ / 5½
White a	1.35-1.50	13½ / 14½

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Scrap Rubber Ceilings

Inner Tubes†	¢ per Lb.
No. 2 passenger tubes	7¾
Red passenger tubes	7½
Passenger tubes	6
Tires‡	**$ per Short Ton**
Mixed passenger tires	20.00
Beadless passenger tires	26.00
Solid tires	36.00
Peelings†	
No. 1 peelings	47.50
No. 2 peelings	47.50
No. 1 light colored (zinc) carcass	52.50
Miscellaneous Items‡‡	
Air brake hose	25.00
Miscellaneous hose	17.00
Rubber boots and shoes	33.00
Black mechanical scrap above 1.15 sp. gr.	20.00
General household and industrial scrap	15.00

† All consuming centers except Los Angeles.
‡ Akron only.
‡‡ All consuming centers.

Financial

(Continued from page 484)

B. F. Goodrich Co. of Canada, Ltd., Kitchener, Ont. For 1942: net income, $281,653, against $115,570 in 1941; income and excess profits taxes, $730,393, against $200,000.

United Shoe Machinery Corp., Boston, Mass. Year ended February 27, 1943: net income, $7,906,099, equal to $3.27 a common share, contrasted with $9,771,027, or $4.08 a share, in the preceding fiscal year; income and excess profits taxes, $15,300,000, against $7,650,000; reserve for contingencies, $2,200,000, against $1,000,000.

(Continued on page 510)

CHEMICAL

United States

2,321,728. An Interpolymer of a Base Substance Selected from the Group Consisting of the Methyl and Ethyl Esters of Acrylic and Methacrylic Acids Copolymerized with Not More Than 10% of a Substance from the Group Consisting of Acrylic and Methacrylic Anhydrides, and with not More Than 50% of a Substance from the Group Consisting of the Vinyl Esters of Acrylic and Methacrylic Acids. C. E. Barnes, Worcester, Mass., assignor, by mesne assignments, to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,321,759. Preparing a Molding Compound by Polymerizing together Methyl Methacrylate and a Compound from the Group Consisting of Styrene, Vinyl Acetate, and Methyl Acrylate. M. L. Macht, Jersey City, and D. A. Fletcher, Bloomfield, both in N. J., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,321,764. Moistureproofing Coating Composition Including a Solution in Toluene of Wax, Cyclized Rubber, and Tetraethyl Diamino Diphenyl Methane: the Cyclized Rubber Has Been Prepared by Heating Rubber with an Amphoteric Metal Halide. J. A. Mitchell, Kenmore, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,321,896. The Products of the Conjoint Polymerization of p-Chlorostyrene and between about 0.1% and 25% of Its Weight of a Compound Selected from the Class Consisting of Neutral Unsaturated Esters and Ethers Containing at Least Two Ethylenic Linkages. E. C. Britton and W. J. Le Fevre, assignors to Dow Chemical Co., all of Midland, Mich.

2,321,942. Polymers Resulting from Heating in the Presence of a Metallic Drier an Ester of an Unsaturated Polycarboxylic Acid and an Acyclic and Completely Aliphatic Mono-Unsaturated Monohydric Alcohol in Which All the Carboxylic Groups Are Esterified by the Alcohol, and in Which the Carbinol Group Is Attached Only to a Saturated Carbon Atom. H. S. Rothrock, Wilmington, Del., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,322,072. Solid, Plastic Copolymerizates Obtained by the Polymerization of an Iso-Olefin with a Conjugated Diolefin in Contact with a Solution of a Friedel-Crafts-Type Catalyst. R. M. Thomas, Union, and I. E. Lightbown, Roselle, both of N. J., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

2,322,073. Method of Preparing an Isobutylene Interpolymer Including the Step of Mixing Isobutylene, and a Diisopropenyl Substituted Hydrocarbon Compound Having Seven to Twelve Inclusive Carbon Atoms per Molecule. R. M. Thomas, Union, N. J., and W. J. Sparks, Alexandria, Va., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

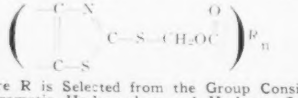
2,322,121. Butadiene Made by Subjecting 2-Butene to a Temperature of about 797° C. for 0.15-Second, Quickly Cooling the Gases to a Temperature Not More Than 500° C. and Then Separating Butadiene. P. K. Frolich, Westfield, and B. M. Vanderbilt, Cranford, both in N. J., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

2,322,240. Urea-Formaldehyde Resin Plasticized with a Compatible Reaction Product of a Polyamine with a Hydroxy-Carboxylic Acid Having at Least Eight Carbon Atoms. E. L. Kropa, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,322,309. Process for the Preparation of Flocculose Polymers of Vinyl Halides Which Includes Agitating in a Closed System and Polymerizing the Vinyl Halide Essentially Free from Other Polymerizable Materials in an Aqueous Solution Containing 0.25 to 5% of a Polymeric Water Soluble Acid of the Class Consisting of Polymeric Acrylic Acid, Polymeric Methacrylic Acid and Interpolymers of at Least One of the Acids with an Ester of the Acids. L. B. and W. M. Morgan, both of Blackley, Manchester, England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,322,316. Production of a Material Selected from the Group Consisting of Polymerized Rosin and Polymerized Rosin Esters in Highly Refined Form by Contacting a Material Selected from the Group Consisting of Rosin and Rosin Esters Dissolved in an Inert Organic Solvent therefor with a Mineral Acid Polymerization Catalyst to Effect Polymerization. A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.

2,323,037. Vulcanizing Rubber by Heating It and Sulphur in the Presence of a Rubber Vulcanization Accelerator Comprising a Neutral Ester Having the Formula



Where R is Selected from the Group Consisting of Aromatic Hydrocarbon and Hydroxy Substituted Aromatic Hydrocarbon Groups and n Is an Integer Less Than Three. M. W. Harman, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,323,119. Making Sponge Rubber by Adding to Latex Containing Ammonia At Least 0.5-Part of Formaldehyde per 100 Parts of Rubber Solids of the Latex, but Insufficient to React with all the Ammonia Present, and Heating without Coagulation at a Temperature above 100° F. for at Least Four Hours, and Compounding the Latex with at Least 10 Parts Filler Material per 100 Parts of Rubber Solids of the Latex, Converting the Compounded Latex into a Foam, and Coagulating the Latex in the Foam to Form Sponge Rubber. W. J. Clayton, Mishawaka, Ind., assignor to United States Rubber Co., New York, N. Y.

2,323,130. A Composition of Matter Comprising a Cured Intimate Mixture of Polymerized Chloroprene and an Organic Condensation Product of Polymerized Cashew Nut Shell Liquid and Hexamethylene Tetramine, the Ratio of the Quantity by Weight of the Polymerized Chloroprene to the Quantity by Weight of the Organic Condensation Product Being as Great as about 1 to 1. M. T. Harvey, East Orange, N. J., assignor to Harvel Corp., a corporation of N. J.

2,323,185. Producing Rubber Hydrohalide by Treating Rubber in a Solution by Introducing Gaseous Hydrogen Halide of the Group Consisting of Hydrogen Chloride, Hydrogen Bromide, and Hydrogen Iodide in the Presence of Butyl Alcohol as Relatively Inert Fluidity Agent. T. M. Andrews and H. F. Reeves, Jr., both of Weeks, assignors to Bay Chemical Co., Inc., New Orleans, all in La.

2,323,338. Inhibiting Thickening and Gelling of a Liquid Dispersion of Malodorant-Free Plastic Polymerized Chloroprene in an Organic Solvent, by Incorporating in the Dispersion a Salt of the Group Consisting of Sodium Monobasic Phosphate (NaH_2PO_4) and Sodium Phosphite (Na_2HPO_3). A. D. Macdonald, Malden, assignor to B. B. Chemical Co., Boston, both in Mass.

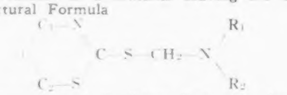
2,323,363. Polyvinyl Acetal Resin Compression or Injection Molding Composition, Having a Decreased Tendency to Stick to a Mold after Molding, containing a Polyvinyl Acetal Resin Having from about 5% to 20% Hydroxyl Groups Calculated as Polyvinyl Alcohol up to about 16% Acetate Groups by Weight, and the Balance Acetal, and Normally Having a Tendency to Stick to a Mold, to Which has Been Added a Sufficient Proportion of a Mono-Hydroxy-Carboxylic Acid Having at Least Three Carbon Atoms Effective to Reduce the Tendency to Stick to a Mold. G. W. Whitehead, Springfield, Mass., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,323,706. Polymerizable Composition (1) of at Least One Polyester Obtained by Reaction of a Polycarboxylic Acid with a 3-Hydroxy Alkene-1 Corresponding to the Formula

$$\begin{array}{c} \qquad\qquad\quad R \\ \qquad\qquad\quad | \\ CH_2{=}CH{-}CHOH \end{array}$$

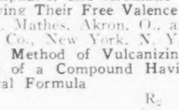
Where R Represents a Monovalent Hydrocarbon Radical, and (2) at Least One Unsaturated Alkyd Resin. G. F. D'Alelio, Pittsfield, Mass., assignor to General Electric Co., a corporation of N. Y.

2,323,923. Method of Vulcanizing Rubber in the Presence of a Material Having the General Structural Formula

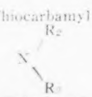


Wherein C_1 and C_2 Form Part of a Saturated Alkylene Chain, R_1 is a Member of the Class Consisting of Hydrogen and Aliphatic Radicals, and R_2 is a member of the Class Consisting of Hydrogen Aliphatic, and Aromatic Radicals, the Radicals Having Their Free Valence on a Carbon Atom. R. A. Mathes, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,323,940. Method of Vulcanizing Rubber in the Presence of a Compound Having the General Structural Formula



Wherein R_1 is a Thiocarbamyl Group, and



Is a Hydrocarbon Substituted Amino Group in Which not More Than One of the Hydrocarbon Substituents Is Aromatic. A. W. Sloan, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,324,056. Rubber Composition Containing an N-(Amino-Aryl) 2,5-Dimethyl Pyrrole as an Atmospheric Cracking Inhibiter. B. C. Barton, Passaic, N. J., assignor to United States Rubber Co., New York, N. Y.

2,324,186. Retarding the Deterioration of Rubber Due to Flexing by Incorporating in a Vulcanizable Rubber Composition a Dihydroxy Substituted Biphenyl Wherein Both Hydroxyl Groups Are Attached to the Same Phenyl Nucleus. R. T. Armstrong, Radburn, and E. J. Hart, Nutley, both in N. J., assignors to United States Rubber Co., New York, N. Y.

2,324,278. A Pellical Comprising a Rubber Hydrochloride Composition Containing a C-Alkyl Substituted Piperazine, in Which the Alkyl Radical Contains from One to Two Carbon Atoms, and in a Small Amount Sufficient to Retard the Photochemical Disintegration of the Rubber Hydrochloride J. P. Chittum and G. E. Hulse, both of Passaic, N. J., assignors to United States Rubber Co., New York, N. Y.

2,324,426. Abrasive Article Comprising Abrasive Grains and a Binder therefor Comprising the Neutralization Product of an Alkali with a partial Polyvinyl Ester of a Polybasic Acid. N. P. Robie, Lewiston, assignor to Carborundum Co., Niagara Falls, both in N. Y.

2,324,427. Abrasive Article Comprising Abrasive Grains and a Binder therefor Comprising the Neutralization Product of an Alkali with a par-Heteropolymer of an Olefinic Acid and a Compound Containing the Vinyl Group. N. P. Robie, Lewiston, assignor to Carborundum Co., Niagara Falls, both in N. Y.

Dominion of Canada

413,223. Production of Butadiene Including Leading Gaseous Normal Butylene at Temperatures between 600° and 800° C. over a Catalyst Practically Free from Alkali and Iron Selected from the Group Consisting of Graphite and Lustrous Black Carbon, the Time of Contact Being at the Most One Second While Avoiding Contact of the Gaseous Reactants with Substantial Amounts of Alkali and Iron. Jasco, Inc., Linden, N. J., U. S. A., assignee of I. G. Farbenindustrie A. G. Frankfurt a. M., assignee of O. Grosskinsky, Schkopau, and N. Roh and G. Hoffman, both of Ludwigshafen-on-Rhine, co-inventors, Germany.

413,224. Butadiene Production That Includes Dehydrogenation of Butylene, Which Consists in Leading a Gaseous Mixture of Normal Butylene with Steam at Temperatures between 500° and 700° C. over a Catalyst Containing More than 50% of Zinc Oxide and at Least One Oxide of an Element of the Group Consisting of Chromium, Vanadium, Molybdenum, Uranium, and Tungsten. Jasco, Inc., Linden, N. J., U. S. A., assignee of I. G. Farbenindustrie A. G., Frankfurt a.M., assignee of O. Grosskinsky, Schkopau, and N. Roh and G. Hoffman, and N. Roh and G. Hoffman, both of Ludwigshafen-on-Rhine, co-inventors, all in Germany.

413,476. Composition of Matter Suitable for Application to a Fibrous Surface at a Temperature of at Least 300° F. Consisting of a Mixture of Approximately 70 Parts of Polymerized Vinyl Acetate and Approximately 30 Parts of Dammar Resin Which Will Not Lose Its Adhesive Qualities When Subjected to High Temperatures. American Can Co., New York, N. Y., assignee of J. E. Robinson, Glen Ellyn, Ill., both in the U. S. A.

413,760. Process for the Preparation of Purified Latex Rubber, Balata, Gutta Percha, Jelutong, Abiurana, Gondang, and Similar Rubber-Like Substances, in Which Latex Is Treated with Lye under Normal Pressure at Boiling Temperature and Then Subjected to Dialysis. Rubber Stitching, Amsterdam, Holland, assignee of H. R. Braak, Batavia-Centrum, Dutch East Indies.

TRADE MARKS

United States

401,555. **Plexene.** Synthetic resinous sheets, rods, tubes, or molding compounds. Rohm & Haas Co., Philadelphia, Pa.

401,560. **Agripol.** Synthetic rubber. Reichhold Chemicals, Inc., Detroit, Mich.

401,564. **Easy Goers.** Footwear. Shelby Shoe Co., Portsmouth, O.

401,602. **Kale-sten-iks.** Footwear. Gilbert Shoe Co., Thiensville, Wis.

401,630. **Remington.** Tires. S & M Tire & Auto Supply Co., Minneapolis, Minn.

401,657. **Film-O-Seal.** Compound for forming an air-sealing coating over the inside of pneumatic tires and tubes. Film-O-Seal Co., Kansas City, Mo.

401,741 **Celotex.** Waterproof adhesives. Celotex Corp., Chicago, Ill.

401,821. Representation of an uplifted hand with the word: **"Rollpruf."** Surgeons' gloves. Pioneer Rubber Co., Willard, O.

401,865. **Atlas Lubricant.** Lubricant for application on prophylactic rubber articles. O. Hayes, doing business as Atlas Laboratories, Akron, O.

401,867. **Randl Kit.** Kits or packages containing prophylactic rubber articles and a tube of lubricant therefor. O. Hayes, doing business as Atlas Laboratories, Akron, O.

401,979. **Vipol.** Synthetic rubber. Viking Chemical Corp., New York, N. Y.

402,001. **X-OL.** Polish for rubber tile, etc. Turco Products, Inc., Los Angeles, Calif.

COTTON & FABRICS

New York Cotton Exchange Week-End Closing Prices

Futures	May 29	June 26	July 3	July 10	July 17	July 24
Aug.	20.08	20.33	20.34	20.42	20.42	20.48
Oct.	19.93	20.00	20.04	20.03	20.02	20.00
Dec.	19.75	19.81	19.87	19.87	19.84	19.81
Jan.	19.71	19.68	19.76	19.78	19.78	19.73
Mar.	19.55	19.59	19.72	19.71	19.69	19.65

A trio of influences, the war, the Washington set-up, and the new crop, caused the market to slope consistently last month. As the Allied invasion of Sicily continued successful, the market grew more and more restrained; and the Italian political upheaval shook it down to the July low.

The War Food Administration suspended marketing quotas on the 1943 cotton crop. Consequently cotton growers may sell all the cotton they harvest this year without penalty. The penalty for cotton marketed in excess of farm marketing quotas had ranged from about 2¢ a pound for 1938 cotton to more than 8¢ for the 1942 stock. The WFA also announced that Commodity Credit Corp. will allow producers until September 15, 1943, to repay outstanding loans and redeem cotton pledged under the 1941 loan program; all cotton not then redeemed will be pooled and sold by CCC. The net proceeds, if any, will be distributed among producers whose cotton has been placed in the pool in proportion to their interest.

Production of cotton sale yarn was frozen July 24 by the WPB to the counts on which spindles were operating on July 3. Purpose of the action was to stabilize cotton sale yarn output temporarily pending a review by the War Production Board of the poundage being produced in each yarn count grouping. Officials emphasized that the action—an amendment to Order L-99-a—should not be interpreted as a permanent "freeze" of spindles to the counts of July 3. WPB also revoked Order M-155—Combed Cotton Yarn—issued May 28, 1942, which had required combed cotton yarn mills to earmark stated percentages of their medium and coarse combed yarn output for the armed forces.

Traders focused attention on the 20.46¢ mid-July parity as the basic loan rate for 1943 at 90% of parity will be based on the July figure. Thus the 1943 average loan rate for 15/16-inch middling cotton may be 19.26¢ gross weight, against 17.22¢ average for 1942. The cotton farm price for pound per bale was 19.60¢ per pound for July 15, 1943, against 19.90¢ for June, 1943, and 18.55¢ for July 15, 1942.

The new crop promises a high yield per acre. Cotton acreage, however, hit a forty-year low, 21,995,000 acres, according to the Crop Reporting Board of the Department of Agriculture. In addition a recent trade report by the Cotton Exchange Service Bureau pointed out that if the harvested acreage this year should be equal to the planted acreage less the ten-year average abandonment from natural causes, and if the average yield per harvested acre should be equal to that last year, the crop would total close to 12,250,000 equivalent 500-pound gross-weight bales, as against 12,824,000 in 1942.

The price of 15/16-inch spot middling grade dropped from 21.88¢ on July 1 to 21.69¢ on July 3, rose to 21.75¢ on July 6, and then declined steadily to the new low of 21.23 on July 26, dropping further to close at 21.10¢ on July 31.

Fabrics

The cotton tire fabric versus rayon tire cord controversy is still being waged. Costs of each are being compared. The trade reported that 1,100 denier tire filament is bringing 43¢ a pound currently. It seems that cotton has a rather slim price edge on rayon in this field. Cotton interests are much concerned about the postwar situation in regard to this problem and, of course, costs of both items may be considerably less by that time. A new type cotton tire fabric is rumored, supposed to be superior not only to older cotton fabrics, but equal to or better than high-tenacity rayon tire cords being used by the armed forces.

Goods for civilian raincoats are rather scarce. The entire dyeing capacity of the industry is absorbed by Army and Navy raincoats and will be for some time to come.

Trade circles stressed reports that the Quartermaster depot had finally completed its need for coating quality sheetings for raincoats. The depot originally called for 62,600,000 yards of these goods on March 23, bids to be opened April 8, with 40-inch 3.60-yard specified and 40-inch 3.15-yard or 40- to 49-inch pro rata types usable. The call was undersubscribed from the start, but it is believed now to have been filled.

Demand for holland and separating fabrics has increased materially; production of these items is inadequate to fill all requirements. Unfortunately, cotton mills are not prone to accept business that would enable converters of gray cloth to predict the future.

New York Quotations

July 26, 1943

Drills

38-inch 2.00-yard	*yd.*	
40-inch 1.45 yard		
50-inch 1.52-yard		$0.29
52-inch 1.85-yard		.23¾
52-inch 1.90-yard		.23223/.2325
52-inch 2.20-yard		.20511
52-inch 2.50-yard		.185
59-inch 1.85-yard		.23851

Ducks

38-inch 2.00-yard D. F.	*yd.*	.215/.225⁄8
40-inch 1.45-yard S. F.		.2975
51½-inch 1.35-yard D. F.		.335
72-inch 1.05-yard D. F.		.43/.45
72-inch 17-21 ounce		.48¾

Mechanicals

Hose and belting	*lb.*	.4275

Tennis

51½-inch 1.35-yard	*yd.*	.315
51½-inch 1.60-yard	*yd.*	.27½
51½-inch 1.90-yard	*yd.*	.23½

Hollands—White

Blue Seal

20-inch	*yd.*	.135
30-inch		.2425
40-inch		.27

Gold Seal

20-inch	*yd.*	.145
30-inch		.2575
40-inch		.29

Red Seal

20-inch	*yd.*	.1225
30-inch		.22
40-inch		.245

Osnaburgs

40-inch 2.34-yard	*yd.*	.155
40-inch 2.48-yard		.14⅝
40-inch 2.56-yard S. F.		.14578
40-inch 3.00-yard		.1275
40-inch 7-ounce part waste		.15
40-inch 10-ounce part waste		.21⅜
37-inch 2.42-yard clean		.1525

Raincoat Fabrics

Cotton

Bombazine 64 x 60	*yd.*	....
Plaids 60 x 48		....
Surface prints 64 x 60		....
Print cloth, 38½-inch, 64 x 60		.08971

Sheeting, 40-inch

48 x 48, 2.50-yard	*yd.*	.16200
64 x 68, 3.15-yard		.13968
56 x 60, 3.60-yard		.11944
44 x 40, 4.25-yard		.09764

Sheetings, 36-inch

48 x 48, 5.00-yard	*yd.*	.08600
44 x 40, 6.15-yard		.06991

Tire Fabrics

Builder

17¼ ounce 60" 23 11 ply Karded peeler	*lb.*	.48

Chafer

14 ounce 60" 20 8 ply Karded peeler	*lb.*	.48
9¼ ounce 60" 10 2 ply Karded peeler	*lb.*	.45

Cord Fabrics

23 5 3 Karded peeler, 1 1/16" cotton	*lb.*	.45
15 3 3 Karded peeler, 1 1/16" cotton	*lb.*	.43
12 4 2 Karded peeler, 1 1/16" cotton	*lb.*	.42
23 5 3 Karded peeler, 1¼" cotton	*lb.*	.55

Leno Breaker

8¼ ounce and 10¼ ounce 60" Karded peeler	*lb.*	.45

Financial

(*Continued from page 507*)

Eagle-Picher Lead Co., Cincinnati, O., and subsidiaries. Six months to May 31: net profit, $1,170,215, equal to $1.29 a common share, against $923,170, or $1.01 a share, for the corresponding period last year; provision for income and excess profits taxes, $1,200,000, against $1,500,000.

Firestone Tire & Rubber Co., Akron, O., and subsidiaries. Six months ended April 30: net profit, $6,387,797, equal to $2.60 a common share against $5,193,024, or $1.97 a share, in the same period last year.

General Tire & Rubber Co., Akron, O. Six months ended May 31: net profit, $962,265, or $1.70 a share, against $642,210, or $1.09 a share, in the same period last year; net sales, $25,910,741, against $13,391,741.

Servus Rubber Co., Rock Island, Ill. Year ended February 28, 1942: net profit, $237,445, or $2.42 each on 96,189 common shares, against $220,328, or $1.50 each on 137,275 shares, in the preceding 12 months.

S. S. White Dental Mfg. Co., Philadelphia, Pa. First quarter: net profit, $183,709, equivalent to 62¢ a share, against $128,478, or 43¢ a share, in the March quarter last year; net sales, $4,132,998, against $3,019,574.

OBITUARY

F. A. Pope

F. ALTON POPE, president and treasurer of the Cleveland Liner & Mfg. Co., Cleveland, O., died suddenly of pulmonary embolus at his home in that city on July 7. Burial was in Lakeview Cemetery on July 9.

Mr. Pope, who was in his seventy-ninth year, was born in Cleveland and lived there all his life, where he was active in both business and social circles. He founded the Cleveland Mixer & Mfg. Co. in 1918, which was in turn succeeded by the Cleveland Liner & Mfg. Co. in 1922. Up to the time of his death Mr. Pope was in his office practically every day and kept in close touch with all business details.

He was a Shriner and a member of both the York and Scottish Rite Masonic bodies as well as of several other organizations including the Cleveland Greys.

The deceased is survived by his son, Ervin C. Pope, long associated with him in business, and by two grandchildren.

John A. Wilson

FOLLOWING an operation, John Austin Wilson, a director and general manager of Viceroy Mfg. Co., Ltd., West Toronto, Ont., Canada, died in a Toronto hospital on May 25. Born in Toronto on May 18, 1900, he was educated in the public schools and Oakwood Collegiate Institute, graduating from the latter in 1917. Commencing as an office junior in 1918, Mr. Wilson served in capacities of increasing responsibility with the Viceroy company, becoming a director in 1936 and general manager early last year.

The deceased belonged to the Toronto Board of Trade, the Toronto Board of Trade Club, and the Royal York Golf Club. He was also a member and a founder of the Stationers Guild of Toronto and of the Canadian Playthings Manufacturers Association and a past-president of the latter.

Funeral services were held in Humbercrest United Church on May 28, with interment in Park Lawn Cemetery, Toronto.

Mr. Wilson leaves his wife, his parents, two daughters, a son, two brothers, and two sisters.

Earl F. Glover

A STREPTOCOCCUS infection caused the death, on July 16, of Earl F. Glover, president of Air Cruisers, Inc., manufacturer of rubber boats, rafts, barrage balloons, etc., Clifton, N. J. Mr. Glover, who was born in Utica, N. Y., 51 years ago, established Air Cruisers about 12 years ago.

He belonged to the Upper Montclair Country Club.

Mr. Glover leaves a son and three brothers.

A solemn high requiem mass was sung at St. Paul's Church in Clifton on July 19.

Philip H. Brown

PHILIP H. BROWN, a director of Turner Halsey Co., New York, N. Y., and president of its subsidiary, Harlomoor Co., Inc., died suddenly at his home in Scarsdale, N. Y., on July 21. He was born March 24, 1888, and was graduated from Bowdoin College in 1909 and Columbia University Law School in 1911. After admittance to the bar in 1912 he served in his father's law office a year. Then he worked for the following textile concerns: Fearing, Whitin & Co., and Delano, Bartlett & Dexter, both of Boston, Mass. In 1925 the deceased organized the Philip H. Brown Department of Farnsworth-Hoyt & Co., an affiliate of National Fabric & Finishing Co., of which he became an executive vice president. He joined Turner Halsey on January 1, 1931.

A well-known golfer, Mr. Brown belonged to the Scarsdale Golf, Merchants, and Arkwright clubs. He was also a member of Psi Upsilon of Bowdoin.

Survivors include the widow, three sons, and two sisters.

Funeral services were conducted July 23 at St. John's Episcopal Church, Cape Vincent, N. Y., where burial also took place.

Albert D. Thornton

AFTER a short illness Albert Devereux Thornton, retired executive of Dominion Rubber Co., Ltd., Montreal, P. Q., Canada, died at his home in Westmount, P. Q., on June 26. The deceased was born in 1869 in Curdworth, England, where he received his formal education. After coming to Canada in 1892, however, he took a post-graduate course in chemistry at McGill University.

Mr. Thornton obtained employment as a traveling salesman for the Alpha Rubber Co., Montreal, and when the firm was absorbed in 1896 by the Canadian Rubber Co., now known as the Dominion Rubber Co., Mr. Thornton went to the new concern. There he organized the chemical laboratory, which he operated for two years, when he next became foreman of the millroom of the shoe department; then he later was made manager of the wash house, reclaiming, and the manufacture of cements and varnishes. In 1901 he assumed responsibility for costs, compounding methods, make-up, cure, etc., of all manufacturing for the company, and in 1903 he was appointed superintendent of the general rubber goods factory, later to become general superintendent of the entire plant and then general technical superintendent. Mr. Thornton subsequently was named a director and a vice president of the company. He was also a former director of Canadian Consolidated Rubber Co., Ltd. He retired from active business about 1930.

The deceased was a Justice of Peace for the Province of Quebec; a member of Engineers Club, Royal Victoria Lodge, the Scottish Rite; a 32nd degree Mason; an honorary member of the Rotary International and of the Royal Montreal Regiment; a past president of the Montreal Rotary Club, Summerlea Golf Club, St. George's Society, and the Westmount Library Board; a director and past president of Boys' Home, Weredale House; chairman of the Westmount Library Board; a member of the Church of St. James the Apostle and a delegate of that church to the Anglican Synod; and a former director of the Rubber Association of America, Inc.

He leaves his wife, a son, a daughter, two brothers, and two sisters.

Funeral services were held in St. James Church on June 29, with interment in Mount Royal Cemetery.

B. M. Robinson

FOLLOWING a brief illness Bernard M. Robinson, secretary, general counsel, and a director of the Firestone Tire & Rubber Co., Akron, O., passed away in Cleveland on July 3. He had entered Firestone's employ in 1918 and organized its legal department. He was elected a director in 1929.

Mr. Robinson was born on a farm near Marshall, Ill., on September 22, 1886. He was educated at grade and high schools in Terre Haute and Indianapolis and the University of Indiana. After brief service as an athletic coach he entered law practice at Brazil, Ind., and from 1913 to 1915 was county prosecutor there. He was also very active in Akron's community life.

He leaves his wife, two daughters, a son, two grandchildren, and a sister.

Rims Approved and Branded by The Tire & Rim Association

Rim Size	June, 1943
15" & 16" D. C. Passenger	
16x4.00E	19,581
16x4.25E	8,193
16x4.50E	3,990
16x5.00E	3,880
16x5.00F	2,809
15x5.50F	5,153
16x5.50F	733
16x6-L	991
17" & Over Passenger	
18x2.15B	10,054
Military	
16x4.50CE	58,178
16x6.50CS	64,222
20x4.50CR	5,364
20x6.00CT	20,283
22x6.00CT	41
18x8.00CV	2,896
20x10.00CW	1,813
24x10.00CW	1,057
Flat Base Truck	
20x3.75P (5")	1,418
20x4.33R (6")	37,028
15x5.00S (7")	3,170
18x5.00S (7")	1,931
20x5.00S (7")	299,700
15x6.00T (8")	3,633
20x6.00T (8")	26,752
22x6.00T (8")	2,374
20x7.33V (9-10")	21,811
22x7.33V (9-10")	1,504
24x7.33V (9-10")	2,180
20x8.37V (11")	6,134
24x8.37V (11")	1,540
Semi D. C. Truck	
16x4.50E	1,442
Tractor & Implement	
15x2.00D	1,629
18x5.50F	4,185
36x5.50R	624
24x8.00T	534
DW8-38	2,145
DW9-38	2,894
DW10-38	1,645
Cast	
20x11.25	1
24x15.00	102
TOTAL	633,914

CLASSIFIED ADVERTISEMENTS

ALL CLASSIFIED ADVERTISING MUST BE PAID IN ADVANCE

GENERAL RATES	SITUATIONS WANTED RATES	SITUATIONS OPEN RATES
Light face type $1.00 per line (ten words)	Light face type 40c per line (ten words)	Light face type 75c per line (ten words)
Bold face type $1.25 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.00 per line (eight words)
Allow nine words for keyed address.		*Replies forwarded without charge*

SITUATIONS WANTED

GRADUATE CHEMIST, 6 YEARS' EXPERIENCE COMPOUNDING and control. Specialized in synthetics. Address Box No. 618, care of INDIA RUBBER WORLD.

ASSISTANT RUBBER CHEMIST JUST COMPLETED SYNTHETIC rubber course, start bottom, conscientious, licensed pharmacist, organic chemistry major. Address Box No. 635, care of INDIA RUBBER WORLD.

PLANT MANAGER—GENERAL SUPERINTENDENT, 38, FAMILIAR with all phases of rubber mass production, including stock control, compounding, Banbury, milling, calendering, tubing, presses, inspection, and laboratory control. Also labor relations, unit cost, estimating, training, and safety methods. Can also supervise building construction, machinery installation, maintenance, and repair. Thoroughly experienced with tires, tubes, and mechanicals. Available September first. Address Box No. 636, care of INDIA RUBBER WORLD.

SITUATIONS OPEN

EXCEPTIONAL OPPORTUNITY FOR GOOD RUBBER MAN IN Massachusetts factory near Boston making Rubber Tapes for the Government and supplies for essential civilian need. To relieve present executive and later take full charge. Post-war prospects excellent. Address Box No. 613, care of INDIA RUBBER WORLD.

AN UNUSUAL OPPORTUNITY TO DO ORIGINAL research work is available for a Research Chemist or Chemical Engineer interested in securing a position with a manufacturer of essential materials located in the Metropolitan New York area. Applicant selected must be familiar with the technical aspects of tire construction and have a background of experience in the use of rubber dispersions and latex in tire cord saturating for crude and synthetic tires. State all particulars, including salary expected and draft status in first letter. Release required if now employed in essential industry. Address Box No. 614, care of INDIA RUBBER WORLD.

WANTED: SALES MANAGER FOR GENERAL RUBBER LINE. Should have 15 years' experience in selling rubber products. Give references and salary requested. Address Box No. 615, care of INDIA RUBBER WORLD.

WANTED: EXPERIENCED RUBBER CHEMIST. ONE WHO HAS had charge of laboratories, experienced in research work. Give references and salary requested. Address Box No. 616, care of INDIA RUBBER WORLD.

WANTED: CHEMIST EXPERIENCED IN FORMALDEHYDE AND synthetic resin plastics. Give references, salary requested, and experience. Address Box No. 617, care of INDIA RUBBER WORLD.

CUBAN RUBBER PLANT WISHES TO EMPLOY AN EXPERIenced engineer and foreman for the manufacture of mechanical rubber goods. Good salary. State experience, qualifications, etc. Write COMPANIA INDUSTRIAL CUBANA DE GOMAS, 15 Tiffany St., Danielson, Conn.

WANTED: EXPERIENCED MAN FOR PRODUCTION SCHEDULing and time-study work in rubber plant in Detroit area. When replying state age, qualifications, present and past employment, and other pertinent information. Address Box No. 621, care of INDIA RUBBER WORLD.

RUBBER CHEMIST—TAKE CHARGE OF RESEARCH AND DEvelopment of Synthetic Latices, Resin Emulsions, Reclaim Rubber Dispersions. Give full particulars regarding experience, age, draft status, salary expected. Location New York. Address Box No. 622, care of INDIA RUBBER WORLD.

RUBBER CHEMIST WANTED BY DIPPED RUBBER GOODS MANufacturer using cement and liquid latex processes. Must be experienced and able to work out synthetic rubber program. Position permanent. Address Box No. 625, care of INDIA RUBBER WORLD.

SITUATIONS OPEN (Continued)

WANTED: ONE OR TWO MEN TO WORK FOR A rubber and plastics chemical supply company, giving technical service to customers. State age, experience, salary, draft status, etc. Address Box No. 624, care of INDIA RUBBER WORLD.

CHEMIST—TIRE, TUBE, OR MECHANICAL. LABoratory, control, or research. Excellent opportunity with well-established organization located in Pennsylvania. Reply all details first letter. Address Box No. 627, care of INDIA RUBBER WORLD.

CHEMIST-ASSISTANT CHIEF—OPENING IN MEdium-sized organization, either laboratory or plant. Tires and press goods. 100% defense with excellent post-war opportunity. Investigate if not now employed at your highest skill. All replies strictly confidential during all negotiations. Address Box No. 628, care of INDIA RUBBER WORLD.

PRODUCTION SUPERVISOR — TIRES, TUBES, mechanical goods. Opening for a high-grade director of plant activities. 100% defense with attractive post-war opportunity. Salary commensurate with ability. Address Box No. 629, care of INDIA RUBBER WORLD.

MECHANICAL AND MAINTENANCE ENGINEER —Tire and Tube Plant located in Pennsylvania. Reply full details, background, experience, etc., to Box No. 630, care of INDIA RUBBER WORLD.

CHEMIST—BACKGROUND IN VARNISH, PLASTICS, SYNTHETIC rubber, wanted for compounding laboratory of progressive compounder and processor of plastics and synthetic rubber in northern New Jersey. Knowledge of testing methods desirable. Excellent salary. Only first-class men considered. Address Box No. 634, care of INDIA RUBBER WORLD.

LIFE RAFT PRODUCTION SUPERINTENDENT. AN EXPERIENCED Life Raft production man, who may now be occupying a secondary position, may find here an opportunity to put his full talents to work scheduling, planning, and supervising the production of Life Rafts. The position we have open is directly under our Production Vice President. We are an established and experienced New England manufacturer of Life Rafts employing several hundred people in the department. Give us complete details of your experience in your first letter and salary expected. Your reply will be held in complete confidence. Assured future for the right man. Address Box No. 637, care of INDIA RUBBER WORLD.

WANTED: TWO OR THREE MEN TO WORK IN compounding and testing laboratory of a rubber chemical supplier. Advise education and experience. Address Box No. 638, care of INDIA RUBBER WORLD.

(Classified Advertisements Continued on Page 514)

Classified Advertisements

Continued

MACHINERY AND SUPPLIES FOR SALE

FOR SALE: 1—W. S. 15"x18" Hydraulic Press, 10" dia. ram; 2—D. & B. 2[illegible]x20½" platens; —14"x24" Press, 9" ram; 9—24"x55" Steel Cored Heating Platens; 1—26x66" 3-roll Calender; 1—Hydraulic Belt Press, 6'x30' with belt stretcher complete; 1—Farrel-Birmingham 15"x36" Rubber Mill; 4-W. & P. Mixers; Adamson 6" Tuber; Dry Mixers; Pulverizers; Grinders; etc. Send for complete list. CONSOLIDATED PRODUCTS CO., INC., 13-16 Park Row, New York, N. Y.

FOR SALE: 1—22x64—3-ROLL BIRMINGHAM COATING AND friction Calender with No. 3 Birmingham Herringbone reduction drive. 1—18x48—3-roll Birmingham Coating and Friction Calender with No. 1 Birmingham Herringbone reduction drive. Both units excellent condition. Address P. O. Box 852, La Crosse, Wisconsin.

FOR IMMEDIATE SALE: ONE VULCANIZING DRUM. INSIDE dimensions 48" diam. by 12'6" long with bolt-on head. Excellent condition. WALKER BROTHERS, Conshohocken, Pa.

FOR SALE BY PRIVATE PARTY: MIXERS, CRUSHERS, AIR compressors, scales, and various mixing and processing machinery. Address Box No. 619, care of INDIA RUBBER WORLD.

FOR SALE: WERNER & PFLEIDERER MIXERS, 9 TO 300 GAL.; No. 20 Banbury Mixer; 2—Double-Door Vacuum Shelf Dryers; Kettles, up to 2,000 gal.; Pumps, Pulverizers, etc. Send for Bulletin. BRILL EQUIPMENT COMPANY, 183 Varick St., New York 14, N. Y.

FOR SALE: VARIABLE-SPEED D.C. CALENDER MOTOR, complete with operating panel and controller; speed 300/900 R.P.M.; horsepower 25/50; volts 230. This motor has been replaced with a larger motor for higher speed. PASSAIC RUBBER CO. Clifton, N. J.

(Classified Advertisements Continued on Page 515)

Classified Advertisements

Continued

MACHINERY AND SUPPLIES WANTED

WANTED: SEVERAL HYDRAULIC PRESSES WITH STEAM-heated platens 15" x 15" and larger to have approximately 1,000 lbs. pressure per square inch. Also large pantograph or profile machines for making dies. Will pay good prices. Send full details to: LASTING PRODUCTS COMPANY, Baltimore 23, Maryland.

WANTED: VACUUM SHELF DRYERS, OR ROTARY VACUUM dryers, with or without accessories. Address Box No. 620, care of INDIA RUBBER WORLD.

LEAD PRESS WANTED; 2,100 TONS, 30-INCH RAM, COMPLETE with cylinder, lead pot, die blocks, pump and motor, including take-up. Must be in good operating condition. Address Box No. 623, care of INDIA RUBBER WORLD.

WANTED: BANBURY MIXER, MILLS, CALENDER, HYDRAULIC Presses, with pump and accumulator. Tubers. Any Condition. Address Box No. 632, care of INDIA RUBBER WORLD.

WANTED: LABORATORY-SIZE RUBBER MILL AND BANBURY mixer with or without drive. Address Box No. 633, care of INDIA RUBBER WORLD.

BUSINESS OPPORTUNITIES

FOR SALE: COMPLETE FAN BELT PLANT, INCLUDING MOLDS, mandrels, belt flipper and automatic steam press with motor. LEFELAR PRODUCTS, INC., Clifton, N. J.

WANT TO BUY SMALL MID-WESTERN RUBBER Factory—prefer small town location. Give full details. Address Box No. 631, care of INDIA RUBBER WORLD.

RUBBER MANUFACTURERS

Experienced rubber merchant with best connections can arrange and finance orders.

We invite your inquiries

WRITE UNDER BOX NO. 626, care of INDIA RUBBER WORLD

Contracts and Sub-Contracts Wanted For Precision Molding

Danbury Rubber Company, Incorporated
Danbury, Connecticut

GRANULATED CORK
FOR EXTENDING RUBBER
SOUTHLAND IRON & METAL COMPANY
P. O. BOX 868 CORK DIVISION NORFOLK, VA.

SMALL RUBBER PARTS for WAR CONTRACTS
BLOWN · SOLID · SPONGE
FROM NATURAL, RECLAIMED, AND SYNTHETIC RUBBER
THE BARR RUBBER PRODUCTS COMPANY SANDUSKY OHIO

An International Standard of Measurement for

Hardness ● Elasticity Plasticity of Rubber, etc.

Is the DUROMETER and ELASTOMETER (23rd year)

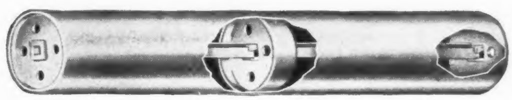
These are all factors vital in the selection of raw material and the control of your processes to attain the required modern Standards of Quality in the Finished Product. Universally adopted.

It is economic extravagance to be without these instruments. Used free handed in any position or on Bench Stands, convenient, instant registrations, fool proof.

Ask for our Descriptive Bulletins and Price List R-4 and R-5.

THE SHORE INSTRUMENT & MFG. CO.
Van Wyck Avenue and Carll Street, JAMAICA, NEW YORK
Agents in all foreign countries.

NEW AND BETTER GAMMETER'S
ALL STEEL ALL WELDED
CALENDER STOCK SHELL



4" 5" 6" 8" 10" 12" diameters, any length.
Besides our well known Standard and Heavy Duty Constructions, we can supply light weight drums made up to suit your needs.

THE W. F. GAMMETER COMPANY
CADIZ, OHIO

MOLDS

WE SPECIALIZE IN MOLDS FOR
Heels, Soles, Slabs, Mats, Tiling and Mechanical Goods

MANUFACTURED FROM SELECTED HIGH GRADE STEEL BY TRAINED CRAFTSMEN, INSURING ACCURACY AND FINISH TO YOUR SPECIFICATIONS. PROMPT SERVICE.

LEVI C. WADE CO.
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BEACON

Direct Source of Supply for

ZINC STEARATE
CALCIUM STEARATE

THE BEACON COMPANY
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IN CANADA:— PRESCOTT & CO., REGD., MONTREAL, P. Q.

COLITE—"The" Mold Lubricant

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